SCHOOL OF EDUCATION

AN INQUIRY INTO FACTORS AFFECTING THE ONLINE LEARNING EXPERIENCES OF A-LEVEL CHEMISTRY STUDENTS STUDYING IN A BLENDED LEARNING COURSE IN A COLLEGE IN MALTA AND THE IMPACT OF THESE EXPERIENCES ON LEARNING IDENTITY

SHARON JOAN ROLÉ B.Sc.(Melit), M.Ed.(Sheffield).

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Abstract

This study carried out as practitioner-research explores the new online collaborative learning experiences of a class of thirty-seven college students studying A-level chemistry in a blended learning context. It is a case-study with a multi-method interpretivist approach using observations, unsolicited meetings, VLE tracking system, students' reflective journal, online informal discussions, questionnaires, focus groups and individual interviews. The students, used to traditional non-collaborative learning methods in the face-to-face class, demonstrated complex online behaviour patterns. Findings showed that the factors affecting these behaviours were of a situational, infrastructural and persona-related nature. Four key learning dispositions – resourcefulness, resilience, reciprocity and responsibility were identified as persona-related enablers. These dispositions were instrumental for changes in the students as learners. These included changes in epistemological beliefs, study patterns, study habits and above all, in learner roles and learning identities. Notable changes occurred in a group of learners who were initially reluctant to learn from the online environment. This study suggests that online learning can not only support a socio-constructive approach to learning to students in the online setting, but also induces similar student learning behaviours in the face-to-face class. The study also gives evidence of transformation in the academic and the positional student learning identities. The new interacting student learning identities projected a sense of belonging, of being valued and of connectedness in both the online and the face-to-face class community. This research is significant as a study of the impact of online experiences on college students in a blended learning context. Similar research contexts were scarce in the literature. It is valuable to the current teaching community in Malta, where the recent National Curriculum Framework (2012) has emphasised a socio-constructive approach to learning and where several educational institutions have started using VLEs to provide blended learning experiences.

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I dedicate this work to my dear husband Avertano and my sons Stéphane and Alexander; also to my dear mother, sister and the memory of my father.

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Chapter 1: Introduction

1.0 Introduction

This research arose out of my passion for developing an understanding of effective teaching and learning. In this chapter, I present the background to the research by describing the setting and the context and by portraying a vision about learning which I have carried for a number of years. I am a teacher of chemistry at a sixth-form college in Malta. As a practitioner-researcher in this study, I undertook this research to deepen my understanding of my practice, to put my new knowledge to practical use (Dadds, 2004) and to disseminate my new understandings to the educational community.

Throughout my past teaching years, I observed my students learn and watched their satisfaction, their enthusiasm or lack of both. I always pondered on ways of how learning perseverance can be instilled in students studying chemistry. Students in their infancy are known to be curious, enthusiastic, creative, determined and persistent to learn (Shank and Cleary, 1995; Siraj-Blatchford, 2004; Thomas, 1980). Their dispositions to learn are described as especially powerful and are associated with positive personal and social identities (Siraj-Blatchford, 2004). Nonetheless, towards the end of the elementary years, they can often lose their interest in school-like tasks and become ‘sullen, withdrawn, disrupting and underachieving’ (Thomas, 1980, p 215).Why does this happen?

Chemistry is considered to be a difficult subject (Bennett, n.d.; Sirhan, 2007). There have been several theories and proposed pedagogies promising effective and efficient learning. This is indicated by the shifts in learning paradigms (Section 2.1.2.2). However, despite the existing efforts by educational authorities to promote change, e.g., National Curricula (Section 1.2.1), the process of change can be slow in progress or difficult to implement (Section 1.2.5).

From the beginning of my teaching career, I set out on a journey reflecting on how to create good conditions for learning. In the small world of my class, I have embarked on a personal endeavour to make learning of chemistry an efficient, effective and enjoyable process. I have been in search of learning tools and opportunities to use in appropriate and effective ways to augment the learning experience, raising the potential for the learners to regain enthusiasm and enjoy learning.

The purpose of this research is to explore the students' experiences of online collaborative learning, and to investigate the resultant changes in the learning behaviour and identities of the students. This research is a phenomenological case study of thirty-seven students (cohort 2007-2008), during their first year studying Advanced-level chemistry, at the Junior College in Malta. These sixth-form students were given the opportunity to learn chemistry through a blended learning approach using the enhancement model (Section 2.1.1.1). The VLE extended the classroom walls, as students accessed the virtual learning environment (VLE) after college hours from their homes.

In this chapter, I describe the context of this research. Then, I review the major strategies and policies which concern the use of technology and the pedagogy in Maltese educational institutions. This is followed by a presentation of my journey in teaching and learning, which led to the development of my pedagogical approach and the writing of this thesis. Finally, I briefly discuss the research questions and give an overview of the chapters in the thesis.

1.1 The context of this research

1.1.1 Malta

The Maltese archipelago consists of two inhabited and three small uninhabited islands. The islands are located in the Central Mediterranean Sea, 92 km south of Sicily. Malta, the largest and most southerly island is 27 kms long and measures 14 kms at its widest point. With a total surface area of 316 km^2 and a population of 405,000 (NSO, 2011), the Maltese islands are amongst the most densely populated countries in the world.

Malta's pre-history dates back to 5000 B.C., whilst its documented past is traceable over a period of 2000 years. Its strategic location has made it subject to a succession of rulers, including the Phoenicians, the Romans, the Arabs, the Knights of the Order of St John, the French and the British. Malta is a member of the United Nations. It gained political independence from Britain in 1964, became a republic in 1974, and joined the European Union in 2004.

The national language is Maltese, but both Maltese and English are the official languages of administration. The Maltese language is a Semitic language, and it is the only Semitic language written using the Latin alphabet. The language is distinct with a strong romance substructure including a great number of loan-words from other languages such as Italian and English.

Both Maltese and English are used interchangeably throughout the whole educational system. The text-books for most subjects are set in English. The teaching of several subjects in the form of lecturing and teacher handouts is mostly in English.

1.1.2 Education in Malta

The Education Act (1988) regulates education in Malta. All educational institutions in Malta abide by the national curricula (1988, 1990, 1999) and framework (2012) set by the Ministry of Education (Section 1.2.1).

Schooling is compulsory from the age of 5 to 16 years. State education is free throughout all levels in education which are kindergarten (3-4 years), primary (5–11 years), secondary (12–16 years), post-secondary (16+) and university (18+). Textbooks and transport are also free in primary and secondary state schools. In addition to state schools, there are around thirty-three church schools and ten fee-paying independent private schools. Church schools accept a donation from parents. Students attending post-secondary institutions and the University receive study-grants.

1.1.2.1 Primary and Secondary Education

Primary education covers from Year 1 to Year 6. Up to the year 2010, students sat for tests at the end of Year 4 and Year 5 to be streamed according to the

tests' results. At the end of Year 6, students sat for the National Junior Lyceum examinations to get a place in one of the ten state secondary Junior Lyceums. Year 6 boys also sat for the 11+ Church school examinations to compete for entry into the much sought-after places in the seven church secondary schools. Both sets of highly competitive examinations consisted of test papers in 5 subjects namely, Maltese, Mathematics, English, Religion and Social studies. The students who did not make it to any of these schools attended one of the twenty-four area secondary schools.

The students who participated in this research went through this competitive system in education. In the hope that the 'culture of competitive achievement' (Wain et al, 1995) would be minimized, both the National Junior Lyceum examinations and the Church School examinations were removed in 2010.

1.1.2.2 Post-secondary Education and Tertiary Education

On completing the five secondary years of education, most students sit for the University of Malta Secondary Certificate (SEC) examinations equivalent to the General Certificate of Secondary Education (GCSE) in the UK. Around 60% of the students continue their education beyond the school minimum leaving age (NCHE, 2009, p.36). Passes in the required subjects enable students to attend one of the eight sixth-form colleges, where they follow a two-year course which leads to Matriculation examinations (MATSEC) at intermediate (I-) or advanced (A-) level equivalent to AS or A UK examinations, respectively.

The University of Malta, founded in 1592 by the Jesuits Order, and the Malta College for Arts, Sciences and Technology (MCAST) offer courses at certificate, diploma and degree levels. The former also offers master's and doctorate programmes. The University has 14 faculties and 16 interdisciplinary institutes and 10 centres. There are about 11,000 students including 600 foreign students following full or part time degree and diploma courses, which are run on the credit system. Around 3000 students graduate annually.

1.1.3 The Junior College

The Gian Frangisk Abela Junior College was legally established in 1995 (LN 123, 1995). It was formerly managed by the state Education Division, but was passed on to the University of Malta, with the notion that students would be better prepared for tertiary education (Buhagiar, 2005). Under the new administration, students attend large group lectures (~50 students), and small group (~12 students) teacherials. Students are also allocated individual teachering hours with lecturers.

The college personnel includes the principal, vice-principal, area co-ordinators, subject co-ordinators, academic staff and support staff. There are 31 departments, 184 full-time lecturers, several part-time lecturers and around 2400 students. The scholastic year covers forty weeks (October to June) and is divided into three terms. There are forty-two one-hour lecture slots per week. Students spend two years at the college studying two subjects at A-level and four subjects at I-level.

There are usually five classes taking A-level chemistry and one class taking I-level chemistry per year. As Table 1.1 indicates, students opting for A-level chemistry have eight hours of chemistry sessions per week.

Table 1.1. Allocation of hours for A-level chemistry per week

Face-to-face sessions	Hours per week
Organic chemistry lectures	2
Inorganic and physical chemistry lectures	3
Practical session	2
Teacherial session	1

Different lecturers are assigned to teach the different A-level sessions to the same class. Lecturers are available for three hours weekly for personal teachering with individual students. In most cases, a student requests a thirty-minute teachering session to discuss problems in chemistry. The numbers of

students in a chemistry class are around forty for lectures, twelve for teacherials and twenty for practical sessions.

Generally, students taking chemistry, start the course with intentions of sitting for the MATSEC examinations at the end of the second year, to gain entry to University. Entry requirements for a course at the University are passes in 2 subjects at A-level and four subjects at I-level. Chemistry is a subject entry requirement for dentistry, medicine, pharmacy, science, health science and education (if area of specialisation is chemistry) degree courses. At least a grade B in MATSEC chemistry is required for entry into the medicine degree course and at least a grade C is required for the pharmacy and science courses.

A student at the Junior College receives a stipend of 800 Euros per annum which is deposited in the student's bank account and a maintenance grant of 130 Euros per month which is deposited in a card called 'the smartcard'.

1.2 Technology in the Maltese Education Sector

Over the past two decades, Malta has been preparing the necessary infrastructure for the provision of technology services in education. National Minimum Curricula (1988/1990, 1999), two National ICT strategies (2004, 2008) and a National Curriculum Framework (2012) have been presented by the educational authorities, promoting active learning and ICT/e-learning in educational institutions.

1.2.1 The National Curricula

A National Minimum Curriculum (NMC) was set by the Ministry of Education for primary schools in 1988 and for secondary and post-secondary schools in 1990. Educational policies regarding technology had a vision of integrating technology in all classrooms.

> Technology as a vehicle for teaching, learning and education is being gradually introduced at all levels of primary education; it is planned that by 2002, all students will be having IT as an integral part of their learning process.
>
> Zammit Ciantar, 1996, p.37

The second NMC (1999) stressed the importance for all students to gain access to technology and to train in technology. It emphasised the learning of skills for students to become self-directed learners, able to look for information, availing themselves of resources and capable of evaluating their learning progress and outcomes. The NMC (1999) also encouraged group work and argued that a pedagogy based on group work, would transform the

> competitive and individualistic tendencies, typical of Maltese classrooms, into a hive of synergetic collective endeavour. It is through discussion, exchange of ideas and collaboration with others that we clarify our thoughts, learn how to ask questions, change and elaborate our concepts and gain exposure to different modes of thinking and action
>
> Ministry of Education, 1999, p.24

The recent National Curriculum Framework (NCF) (2012) re-emphasised a pedagogy based on socio-constructivist principles and digital literacy. It stressed a shift to constructive education philosophies, a move from teacher to student-centred learning activities, and the use of technologies to enable children to create knowledge. The science consultation document, published in preparation for the NCF quoted Parker and Rennie (2002) emphasising a pedagogy which creates:

> a supportive learning environment which emphasises communication, interpersonal negotiation, interaction amongst all participants, harassment free discussions and active participation by the students.
>
> Parker and Rennie, 2002, cited in A Vision for Science Education, 2011, p.36

Thus, since the late 1990s, the education policies in Malta, have been geared towards a socio-constructivist approach and active learning in classrooms.

1.2.2 National ICT strategies

Three national ICT strategies were published in 1994, 2004 and 2008 respectively. In 1994, a project financed by the EU, resulted in the setting up of ten-station networked computer laboratories in state secondary schools (Zammit Ciantar, 1996) and a gradual phasing in of ICT equipment, e.g., VCRs, monitors and computers (Zammit, 2004). All primary school teachers were provided with a notebook computer. The ratio of computers to students in

a primary class was 1:7. In 1996, an ICT syllabus was introduced in secondary schools and since 1997, the maths syllabus in secondary schools included MS Excel, Logo, Derive and Cabri.

By the year 2004, all state primary and secondary classrooms were connected to broadband Internet. In 2004, the Ministry of Infrastructure offered software packages, namely Microsoft XP package to all students and teachers for a token fee of 24 Euros. According to Zammit (2004), Malta was successfully meeting the Lisbon objectives (European Council, 2000) regarding ICT infrastructure and training.

A national survey on the use of IT in all 161 schools (state, church and independent) for the scholastic year 2003-2004 indicated that on average, the number of computers was 4 per class at primary level and 2.5 per class at secondary level. ICT peripherals available in schools included 85 digital cameras/video cameras, 80 DVD players, 59 digital projectors, 21 video conferencing facilities and 5 electronic interactive boards. 90% of all schools had access to the Internet. The percentage of teachers who used computers on a regular basis for the preparation of worksheets and handouts was 81.9%. Yet, 31.2 % of the teachers expressed themselves as not confident in using ICT. The majority of these were aged over 50 (NSO, 2005).

Table 1.2. Technology in Maltese households (Source: NSO 2002, 2009, 2010)

Year	**Percentage of Households**	
	With computer	Internet subscribers
2002	38	16
2008	62.6	58
2010	73	70

Table 1.2 shows the increase in technology in Maltese households from 2002 to 2010. The figures in 2010 compared well with the rest of the EU countries, where the average percentage of households with Internet access stood at 70%.

All the students taking part in my research (2007/2008) said that they had a computer and Internet access in their homes (Section 4.2.1). This was the second consecutive year that all students in my class had computers and Internet at home. This contrasts with the student cohort of 1999/2000, where 63% of the students had computers at home and 30% had access to the Internet (Role, 2001).

The 2008 national ICT strategy re-enforced and extended the one developed in 2004. It aimed to make Maltese society, irrespective of age and socio-economic background, confident in the use of ICT, and emphasised:

- the provision of initial digital learning content for schools;
- the diffusion of ICT skills among learners to encourage collaboration, creativity and innovation;
- the development of teachers' ICT skills.

The 2008 strategy incorporated a 22 million Euro investment, and the Ministry for Infrastructure (MITC) launched several projects in 2008, namely:

a. The computer for 0.99 Euros daily scheme: a computer could be purchased for 0.99 Euros a day if the computer cost less than 1165 Euros.

b. The Blue skies scheme: broadband connection was provided to households for 3 Euros per month for the first twelve months.

c. Training and re-training programmes in ICT for the public, and setting up of Computer Training Learning Centres in several villages.

d. Smart Learning: An ongoing project where, all teachers in state schools are provided with notebook computers and training in computer soft skills. Each classroom in all state schools is IT (information technology) enabled with a computer for every 4 students, and an interactive board.

The World Economic Forum Global Information Technology Report 2006-2007 had ranked the Government of Malta as the 2nd most successful government in the world in promoting the use of ICT (di-ve news, 2007). In September 2008, the European Commission described Malta as well advanced

as an information society, and as having many benchmarking indicators significantly above the EU average (Times of Malta, 2008).

1.2.3 A time-line for my class of students

Table 1.3. Timeline: Introduction of ICT in state schools from 1990 to 2009

	Academic Years	**Age**	**Stage**	**ICT in state schools**
1	Oct 1990 - Jun 1994	0-3		
2	Oct 1994 - Jun 1996	3-5	Pre-Primary	
3	Oct 1996 - Jun 2000	5-9	Early & Middle Primary	1computer :7 students
4	Oct 2000 - Jun 2002	9-11	Late Primary	1computer :7 students
5	Oct 2002 - Jun 2005	11-14	Early & Middle Secondary	Computer labs in school since 1994; ratio 1:13
6	Oct 2005 - Jun 2007	14-16	Late Secondary	Computer labs in school since 1994; ratio 1:13 IT and Maths lessons using computers
7	Oct 2007 - Jun 2009	16-18	Sixth-Form College	Computers available only in labs for IT students

The time-line in Table 1.3 is applicable to the student participants in my research. It shows that during their primary school years, the students who attended state schools had the opportunity to be in a class having 1 computer for every seven students. In their secondary school years, the computers were available in computer labs in the ratio of 1:13. The students used computers during IT and some mathematics lessons. ICT integration has been more

advanced in state schools than in non-state schools. 81% (n=30) of the students in this study attended state schools.

1.2.4 Use of Technology at the Junior College

Under the University of Malta administration, the lecturers at the Junior College have been allocated funds to purchase personal computers, computer peripherals and software. However, lecture rooms at the College, in contrast to state schools, were poorly technologically equipped for several years. Until the year 2010, the chemistry department had one overhead projector, a VCR and a monitor.

In 2003, I carried out a survey to investigate the use of e-learning within the chemistry, biology and physics departments at the Junior College (Rolé, 2003). Out of 35 lecturers, one lecturer used a VLE (myself), two lecturers distributed a CD with class notes to their students and another lecturer used email to send class notes to students. Two lecturers claimed that they would use technology, if they were shown how to do it (Rolé, 2003). Other lecturers were reluctant to change their traditional practices; such a situation prevails to this day (Bonello Cassar, 2012). As Sammut (1994) had remarked, the teachers' handouts and model answers dominate classroom practice in the schools in Malta.

In 2005, the IT services at the University launched a VLE (Moodle) for staff and students. In the first five years, five lecturers at the Junior College requested a space in the VLE. IT services regularly organise courses on the technical use of the VLE, but to date, there are no in-service courses regarding the pedagogical use. Currently, all lecturers are automatically allocated a space in the VLE. A recent survey (Bonello Cassar, 2012) regarding VLE use at the College showed that out of 95 respondents (response rate = 63%), 31 lecturers (33%) made use of the VLE. The survey results also indicated that 2 lecturers (6.7%) use the VLE collaborative tools with students. Most lecturers use the VLE to upload notes (96.7%), to post announcements (76.7 %) and to send Internet links to students (76.7%).

Recent (April 2013) discussions within the department of chemistry revealed that two lecturers (including myself) out of a staff of 11 full-time lecturers use

the VLE. The other lecturer uses the VLE for announcements and uploading of class notes. Discussions regarding VLE use for learning with students in my classes pointed to the same conclusion: VLEs are not being used to support learning through collaboration, but mainly for convenience (Pedro, 2010) and as a vehicle for content (Clark, 1994, Armellini and Jones, 2008). Although teachers have the technology, they are still concerned with presenting information, rather than creating opportunities for learners to construct their knowledge (Salomon, 2000; Jenkins and Healey, 2005; Johnson and Dyer, 2005; Luckin, 2011).

Teaching at the College, is predominantly based on the traditional lecture delivery method. During teacherial sessions, students are generally asked to individually work on drill and practice tasks. This contrasts with the pedagogy which is based on socio-constructivist principles, and promoted in the National Minimum Curricula (Section 1.2.1)

1.2.5 A resistance to use technology

Educational practices in schools and colleges do not necessarily follow the policies (Cuban, 2001; Somekh, 2004; Armstrong and Franklin, 2008). Despite national policies and development of IT infrastructure which encouraged active and collaborative learning in Malta, the students in my research (2007/2008), indicated that online-learning was an innovative mode to learn. Many students (68%; Section 5.5.1.2) also said that they had never worked in groups at their previous schools. The IT supportive environment in schools was focused on the teaching of IT-related subjects and not integrated within the learning of non-IT subjects. In fact, a survey in Maltese schools in 2005 revealed that 79.5 % of students were using computers mostly at home and only 13.1 % used computers mostly at school (NSO, 2005).

Since technology was not being used in the classroom, students remained unaware and deprived of its potential benefits for learning. The teachers' resistance to use technology in teaching and learning seems to be a common phenomenon. Cuban (2001) reported that the abundant available technology in Silicon Valley schools in the late 1990s did not result in frequent use of technology in the classroom. Similar reports indicated that, few teachers were

enthusiastic to use e-learning in the classroom (Mumtaz, 2000; DfEs, 2003; Salmon, 2005; San Diego, 2008). Cuban (2001), Salmon (2005) and Browne, Jenkins and Walker (2006) noted that although the technology was available in many institutions, its use did not greatly impact instructional practices. A National Education Association report (NEA (US), 2008), showed that most teachers use technology for administrative tasks and not for instruction. Brown (2010 p.2) reporting on the position of VLEs in UK universities stated that 'while there have been localised instances of successful VLE implementations, overall the picture seems disappointing'.

In a study, covering reports from five countries, including UK and US, Armstrong and Franklin (2008) confirmed that the promoters for inclusion of ICT in curricula are the educational authorities who would want to keep ICT education at the forefront for the benefit of students and a few academics who recognise the potential of technology in teaching. Somekh (2004) stated that institutions are locked in mechanisms of 'mutual constraint' due to the resistance to change in teaching methods offered by teachers. In addition, educational authorities seem to think that if they provide the hardware and network connections, education will automatically become better, faster, more accessible, and cheaper (Ehrmann, 1999). Desai, Hart and Richards (2008) argued that unless technology is included in the blueprint of education as an integrated system, teachers would often consider computers and electronic media as merely add-ons, which they need not use.

The BECTA ImpaCT2 (2002) reported that ICT placed great demands on schools and teachers and its integration in learning and teaching practices was taking a long time. It seems that a lack of pedagogic or technical skills to blend e-learning and classroom teaching, (Ehrmann, 1999; BECTA, 2004; Armstrong and Franklin, 2008; NEA, 2008; Chen, 2010) and time constraints (Donelly and O'Rourke, 2007) are the main inhibiting factors. Another BECTA report (2008) revealed that teachers had mixed views about the impact of ICT on learning and had a tendency to use technology for presentational purposes rather than to promote interacting forms of learning. Buabeng-Andoh (2012) carried out an extensive review of the literature on the personal, institutional and technological factors which encourage teachers' use of computer

technology. In addition to the above-mentioned factors, he also listed a lack of teacher training, a rigid structure of traditional education systems and restrictive curricula.

In the Junior College survey, Bonello Cassar (2012) also found that lack of pedagogic skills in the use of the VLE (30.2%) and a perception that using the VLE is time consuming (27.2%) were the most common inhibitors for VLE use by the lecturers. A study of five primary school teachers in Malta by Gialanze (2011) also indicated that a lack of or inefficient teacher training in the pedagogic use of ICT was a main cause for the lack of use of ICT in their classroom teaching. Teacher training seems to be one of the principal issues.

In the next section, I present my personal journey in teaching and learning, and highlight the episodes in my life which led to using technology for learning, despite the fact that the classrooms at the Junior College were poorly technologically equipped and that my students were accustomed only to traditional learning methods.

1.3 My story of teaching and learning

My story is recounted within a framework built around the following five occurrences in my life:

- an enthusiasm from an early age to ‘teach’;
- facilitating learning in an independent learning programme (1992-1994);
- a member of a study group discussing learning theories (1997-2002);
- discovering virtual learning environments (1998-);
- furthering my studies in online pedagogy - (M.Ed. 2002-2004).

These were the stepping stones that led to my epistemological beliefs and my current ways of teaching. They also led to this research and the writing of this thesis.

1.3.1 My beginnings

My first experience as a teacher in a classroom was in the late seventies, immediately after completing my first degree in science. At the age of twenty-one, I was on the classroom floor, teaching science subjects to secondary school boys and sixth-form students in a church school, without any prior teaching practice, and unaware of existing learning philosophies. I was enthusiastic and eager to teach and firmly believed that I would make a good teacher. Members of my close family, my father and my aunt, were in the teaching profession. As a child, I loved to play teacher. The dining room at my parents' house was my imaginary classroom and a set of exercise-books placed one next to the other on the large dining-table represented fictitious students.

In the 1980's, I taught science subjects at A-level in the state sixth-form colleges. Wherever I taught, keeping each and every student engaged in my lessons was always my goal and my challenge. My lessons were a blend of laboratory work, occasional field work, didactic teaching, and class discussions with students. Pedagogic tools were mainly the blackboard, chalk, slide projector, and any available science laboratory equipment such as microscopes, laboratory glassware and chemicals. In the late 1980s, I used recorded videos and the VCR. Like several other teachers, I always believed that I could make a difference in the lives of the students (Hamburger and Moore, 1997), both regarding their studies at school, and also their future.

1.3.2 A different teaching practice

From 1990 to 1996, I lived in Canberra (Australia) and taught science subjects in several schools as a relief or long-term substitute teacher. This turned out to be an opportunity to observe and reflect upon the teaching practices in various schools in another country. I was immediately struck by the drive to learn 'by doing'. In one college (St Clare's College), I was told by a senior teacher, 'If students cannot prove the principle in the lab, do not mention it in class'. Students were to learn concepts and principles in chemistry, only if they could demonstrate them in the laboratory. This was a different strategy to the one employed in Maltese schools.

In Malta, curricula are examination driven (Fenech, 1988; Sultana, 1977; Buhagiar, 2005) and heavily laden with content (NCF Consultation Document, 2011). Students learn theory with little emphasis on practice and application, and teachers rush through vast syllabi promoting rote learning (Wain et al, 1995). Nonetheless, in 1993, one innovative teaching methodology at St Clare's made a significant change to my teaching career. I voluntarily participated in an innovative independent learning programme as a learning facilitator. In this programme, students learnt independently of a teacher through guided discovery, in the college library. I observed students learn collaboratively with the minimal intervention from me as the learning facilitator. Students researched, discussed amongst themselves and were visibly co-constructing their knowledge (Gunawardena, Lowe and Anderson, 1997).

1.3.3 An interest in learning theories

In 1996, I returned to Malta and resumed my teaching of A-level chemistry at the sixth-form college, which was no longer administered by the state Education Division. It was handed over to the University of Malta so that students learn in 'methods appropriate' for university education (G. F. Abela Junior College Regulations, 1995). This declared official change in teaching practice (Section 1.1.3) encouraged me to put St Clare's independent learning experience to practice with my students in Malta. I was eager to observe students construct knowledge rather than use the teachers' notes and listen to explanations in the classroom. I used a set of independent learning chemistry books (Lainchbury, Stephens and Thompson, 1995) to design the guided discovery learning questions. The students used text-books and science magazines and learnt collaboratively in small groups of four in a reserved area in the library. At around the same time, I joined a study group at the Centre for Communication Technology at the University of Malta. The group met on a weekly basis for three years. In this group, discussions and research focused on instructional design and learning theories. I became fascinated by the ongoing educational debates and the research in the educational field. I had formerly believed that teaching was only a matter of personality traits such as enthusiasm, warmth, care and a sense of humour (Cruickshank, Jenkins and

Metcalf, 2003; Thompson, Greer and Greer, 2004). With this newly gained knowledge on learning theories, I could refine my teaching in the classroom, improve my innovative independent learning practice and share my ideas about teaching and learning with the teaching community.

1.3.4 A move to online collaborative learning

In the late 1990s, I had also joined an online listserv group (DEOS), where online discussions focussed on instructional design and distance learning. It was here that I read about 'learning management systems' (LMSs), now more commonly known in Europe as virtual learning environments (VLEs). I immediately had the feeling that a VLE was ideal for collaboration.

I was pleased with the students' independent learning performances in the face-to-face library environment. However, feeling enthusiastic and excited to use the VLE for collaboration, I set up a VLE for my students. This, in 1999, was my first experience of conducting a blended learning course where online-learning complemented face-to-face class learning.

The VLE was a trial version of Blackboard, which in 1999 was available indefinitely (currently it is available for one month). At the time, 65% of the class had a computer and 30% had Internet access at home. The IT department at the College made their computer laboratories available for my students. I immediately became aware of the potential and benefits of the VLE for learning. Some of the students seemed to be taking control of their learning. Their learning was no longer limited by what the teacher wanted to teach them.

I became intrigued by this new experience and wanted to explore further. My first investigations, were comparative in nature; comparing face-to-face learning with blended learning (Role, 2001). Within the limits of my class, I experimented and reflected on course design. This led to a continual refinement of the online component of the course.

1.3.5 Sharing my experiences

I discussed my experience in the study group at the University and delivered a paper (Role, 2001) about the students' online-learning experience at the Variety of Teaching Chemistry Conference at The University of Lancaster (2001). At the conference, I became aware that independent learning might not be the best term to describe this mode of learning. Some people were associating independent learning with student isolated learning. My students were learning independently of their teacher in the traditional 'transfer of knowledge' sense, but this innovative mode of learning emphasised interactions amongst students. In 2002-2004, I furthered my studies in e-learning pedagogy through participating in a Masters programme at the University of Sheffield. In my thesis I designed, implemented and evaluated a first online course for adults working in a corporation (Role, 2004; Role 2009).

Convinced of the benefits for learning I have been, during the past years, sharing my experiences of integrating online-learning with face-to-face classroom learning and promoting this mode of blended learning. I delivered some academic papers (4) at conferences, and contributed to international projects on technology, namely Ikarus (2004), Avicenna (2006) and PAVE (2007). I have been giving talks at various educational meetings in Malta and for several years, I have been teaching (part-time) online-learning pedagogy at the Faculty of Education at the University of Malta.

1.4 My current pedagogic approach

Year after year, students start my course expecting traditional learning methods such as teacher's handouts, and to work individually through problem solving questions in class and at home. Generally, I find that students are also reluctant to use their text-book or other resources for learning. Nevertheless, I have been determined to replace the cultures of passive learning, individual learning and competition (Section 1.1.2.1; 1.2.1), by self-directed learning and collaborative experiences. My current personal pedagogy has been shaped by a perspective gained from my actual experiences and supported by theory. It has been enriched by my enthusiasm to research and use innovations.

The online environment provided the potential for space and time for discussions, collaboration and support which were not available in the Junior College classroom. It also could provide resources for learning, in addition to the students' textbooks. I believe that the innovative modes of learning are more beneficial and enjoyable to my students.

I believe that true learning gives rise to creativity and that knowledge is constructed in the mind of the individual. What is learnt depends on prior knowledge and thus students have to be exposed to opportunities to be able to understand what they know, to re-enforce or re-adjust and to resolve their cognitive conflicts. Hence, I value and see great benefits if learning occurs in a social context (Vygotsky 1962), where students care for each others' learning and where they accommodate new concepts as they share ideas, discuss, reflect, resolve individual cognitive conflict and co-construct their knowledge (Gunawardena, Lowe and Anderson, 1997).

1.5 Evolving interests

In the mid-2000s, most of the research in e-learning focussed on course description, comparison studies (Lynch and Dembo, 2004), practitioners' perspectives, course design (Conole et al, 2006) and course evaluation studies (Sharpe et al, 2005). Lipponen (2002) reviewed the research on computer supported collaborative learning and reported a scarcity in research on how students participate and on the consequences of different types of participation patterns. Sharpe et al (2005) called for student-focused research.

As, year after year, I conducted online programmes to support face-to face learning, I became intrigued by the students' learning behaviours. The learning habits of some online participants in the face-to-face class were changing. Yet, not all students participate to the same extent in the VLE. This raised various questions, such as:

- why do students behave differently in the VLE?;
- how does online participation change the students as learners?

I was further intrigued by the questions which were emerging, and by the answers which I was anticipating. My curiosity gave rise to the current study. I wanted to explore and document the students' experiences of online participation in an attempt to explain the observed changes in the learners' behaviours.

1.6 This study

This is a case study where, I explored the online experiences of an A-level chemistry class who were accustomed to traditional teacher-centred face-to-face learning. The field research was conducted over a period of two scholastic years and consisted of a fourteen week exploratory study (2006-2007) and a thirty-two week main study (2007-2008) with a different cohort of students.

The broad research questions which guided this research were:

- What are the students' experiences of online-learning?;
- What factors affect the students' experiences?;
- How do the students change as learners?

Using a multi-method interpretivistic research inquiry focussing on the learners' own expressions of their experience (Sharpe et al, 2005b, Tobin 2006), I was able to obtain a deep insight into the lived experience of the students (Schwandt, 1994). It seemed that some students were willing to use the online setting; others were hesitant. Some students were taking particular roles in the online environment. Nevertheless, initial analysis of the emerging data in the first phases of the research (Chapter 3) necessitated a refinement of the research questions (Lincoln & Guba, 1985).

The research questions were eventually refined to the following two overarching questions and each research question was divided into two sub-questions:

RQ 1: What were the experiences of students following an online collaborative program in a blended learning context?

1.1 What were the online behaviour patterns of the learners following a blended course?

1.2 What factors influenced online behaviours in a blended learning context?

RQ 2: What was the impact of these online experiences on the learners?

1.1 How did online participation change the students as learners?

1.2 What was the impact of online participation on the learning identity of the learners in the online and the face-to-face class?

The above questions directed this research and the writing of this thesis. The research design evolved into a zooming-in approach; data was generated from the whole class, but eventually, the study focused on a selected group of twelve students.

The data produced a rich phenomenological description of the students' online and classroom experiences and gave an understanding of changes that were occurring in learners and in the face-to-face class as the students participated in the blended learning programme. This study is of great value in the Maltese educational sector, since, current educational curricula at all levels of education are promoting learner-centred pedagogies and the integration of ICT in classroom education (Section 1.2.1), including the use of VLEs.

1.7 The structure of the thesis

Chapter 1: This chapter described the setting and the context for this research. It presented a picture of the education system in Malta in the 2000s, the drive of the authorities to promote e-learning and the lack of use of technology for teaching and learning. It also revealed how my eagerness and the development of my pedagogic approach to teach chemistry led to this research. It described the drivers for this approach and how this research developed into an investigation of student online behaviour and of the impact of the online experiences on the learning identities of the students.

Chapter 2: This chapter looks at the literature which forms the background to this research. It is divided into three main parts. The first part concerns the nature of blended learning and collaborative learning. The second part is a

review of the literature on learners' online experiences and the factors and learner characteristics which affect online participation. Part III looks at the literature on learning dispositions, which in my study, were identified as key enablers for online participation. This section discusses also the relation between learning and learning identities.

Chapter 3: In this chapter, I discuss my philosophical assumptions and the research methodology. I outline the research which I conducted as a case study with an interpretive phenomenological approach using multi-methods of investigation to provide opportunities for triangulation across the data sets. The data generation methods are fully described together with an account detailing ethical and gain of access issues. The trustworthiness of the study, data management and data treatment processes are also discussed.

Chapter 4: In this chapter I analyse and present the data from observations, questionnaires, student meetings and online discussions, to show who the students were before they started the online course, and who they became during the blended course. This chapter addresses the first research sub-question 1.1 and 1.2 and concludes with a presentation of the students' behaviour patterns.

Chapter 5: This chapter addresses the research sub-questions 1.2, 2.1 and 2.2. It analyses and discusses the results, focussing primarily on the data generated from the individual interviews and triangulates the data presented in Chapter 4. The chapter is divided into two main parts. In the first part, the discussion takes place within frameworks of online challenges faced by the students, of factors affecting online participation and of online behaviour patterns or groups. The second part focuses on the changes in the student academic and positional learning identities of a selected group of students.

Chapter 6: This chapter highlights the outcomes of this research and the contribution to knowledge. It discusses the limitations of this research, potential areas for future research and the implications for practice.

Chapter 2: A Review of the Literature

2.0 Introduction

The research questions (RQ1 and RQ2) and sub-questions (1.1, 1.2, 2.3, 2.4) directed the literature review:

RQ 1: What were the experiences of students following an online collaborative program in a blended learning context?

1.1. What were the online behaviour patterns of the learners following a blended course?

1.2. What factors influenced online behaviours in a blended learning context?

RQ 2: What was the impact of these online experiences on the learners?

2.1. How did online participation change the students as learners?

2.2. What was the impact of online participation on the learning identity of the learners in the online and the face-to-face class?

The literature review is divided into three main parts. Each part helped me understand aspects connected with the students' experiences in this study and address the research questions.

Part I explores the literature on the pedagogy and effectiveness of blended and collaborative learning. This review was essential to provide an understanding of the context of this research and of the impact of these modes of learning on the students' behaviours.

Part II looks at the literature, which helped me deal with the first two research sub-questions, understand the different behaviours of the students and consider the factors affecting online participation. Part II focuses on the online learner, the online learning characteristics, skills and persistence in online courses.

Part III concerns the literature on student learning dispositions and identities. These areas of exploration emerged during the early data analysis phase,

(Section 3.11.2). The literature review in Part III was valuable to address the research questions 2.1 and 2.2 and to understand the concept of learning dispositions. This part supported the analysis of the transformations in the online students as learners in the blended learning setting.

Part 1

2.1 Innovative modes of learning

The students in this study experienced an innovative mode of learning which involved changes from traditional face-to-face learning to blended learning and from an individualistic mode of learning to collaborative learning. I explored the literature on blended learning, and the nature of collaborative learning including the learning theories which underpin it. This enabled me to understand the impact of online collaboration on the students' behaviours.

2.1.1 Blended Learning

Blended learning is essentially a mix of instructional strategies and deliveries (Laster, 2004; Singh, 2003; Driscoll, 2002; Caner, 2010). A generally accepted definition for blended learning does not exist (Picciano, 2009; Oliver and Trigwell; 2005; Sharpe et al, 2006; Graham, 2003), and other terms such as hybrid learning (Woodworth, 2007), mixed mode learning (Pincas and Saunders, 2003) and blended e-learning (Heinze, 2008) are often interchangeably used.

Heinze and Procter (2004) defined blended learning as learning,

> that is facilitated by the effective combination of different modes of delivery, models of teaching and styles of learning, and founded on transparent communication amongst all parties involved with a course.
>
> Heinze and Procter, 2004, p.10

It is widely accepted that blended learning systems combine face-to-face instruction with computer mediated instruction (Rovai and Jordan, 2004; Graham and Dziuban, 2008; Laster, 2004; Garrison and Vaughan, 2008). Although Heinz and Procter (2004) studied settings with a face-to-face and an

online blend, they did not mention these in the definition, but gave importance to the aspect of communication, which they found to be crucial in the blended learning experience (Section 2.1.1.4). Garrison and Vaughan (2008) describe blended learning 'as the thoughtful fusion' of face-to-face and online experiences.

> The basic principle is that face-to-face oral communication and online written communication are optimally integrated such that the strengths of each are blended into a unique learning experience congruent with the context and intended educational purpose.
>
> Garrison and Vaughan, 2008, p.5.

Thus blended learning may be considered as an approach to course design that brings together the best of both face-to-face and online instructional strategies (Rovai and Jordan, 2004; Bourne and Seaman, 2005; Albrecht, 2006; Eduviews, 2009; Mitchell and Honore, 2006; Garrison and Vaughan, 2008).

2.1.1.1 The Blend

Blended courses may differ in the mode of delivery. Various models of blended learning have evolved in educational institutions. These may differ in the ratio in the blend, and in the mode of delivery. For example, Allen and Seaman (2006) distinguished between three types of courses according to the percentage of the online and face-to-face components (Table 2.1). They considered a course to be blended if the online component forms more than 30% and less than 80% of the whole programme.

Table 2.1. The percentage of the online component in each course

Type of course	**Online Component**
Online	More than 80%
Blended	Between 30% and 80%
Web-enhanced	Less than 30%

The Program in Course Redesign (The National Center for Academic Transformation, 2005) identifies three basic models of blended learning: supplemental (enhancement), replacement and emporium models.

In the supplemental model, the traditional face-to-face meetings are maintained and supplemented with out-of-class online activities affording an active learning environment. In the replacement model, the face-to-face meetings are reduced and replaced by interactive online learning. In the emporium model, traditional lectures are eliminated, and the student uses online learning technologies in a computer laboratory supported by face-to-face teacher guidance.

One blended learning experience is different to another, since courses do not only differ in the ratio and mode of delivery, but also in the composition regarding the selection of learning tools and learning activities.

Garrison and Vaughan (2008) presented six blended learning exemplars of courses based on the replacement model and showed how each scenario made use of different tools and learning methods in both the face-to-face and the online setting to address specific learners' needs and to achieve the intended learning goals. For example in small class courses, 'a sustained online community of inquiry that extends beyond limited classroom opportunities' (Garrison and Vaughan, 2008, p.72) is created. In this case, inquiry and discourse replace some of the face-to-face lectures. This gives the teacher more time to engage in student discourse and feedback and students have more time for active learning.

Dziuban, Hartman and Moskal (2004) emphasised that the pedagogical approach to learning is of greater significance than the ratio or composition of the blend. De Freitas and Jameson (2012) also remarked that e-learning is less about delivery and content and more about social interactions and cultural context. The blended learning environment in this research was based on the supplemental model and used a virtual learning environment (VLE) as the technological medium in the blend. Section 2.1.1.4 discusses the pedagogical affordances of a VLE in terms of communication and interactions. The following section discusses the pedagogical approaches for blended learning.

2.1.1.2 An approach for Blended learning

Although, blended learning offers a design approach whereby both face-to-face and online learning are facilitated by the presence of each other (Conrad, 2005; Garrison and Vaughan, 2008), Heinze and Procter (2006) and Garrison and Vaughan (2008) argued that blended learning is not a simple matter of combining face-to-face and online instruction.

Carman (2005) drawing on the work of Keller (1987),Bloom (1956), Gagné (1987), Merrill (1994) and Clark (2002), suggested five components as important elements of a blended learning process in corporate learning: (1) live events which instil motivation; (2) online content, where learners work at their own pace; (3) collaboration, where learners learn together and from each other; (4) assessment which makes learners aware of what they have learnt; and (5) just-in-time reference materials, which enhance learning retention and transfer. The same elements with greater emphasis on collaboration may be applied for blended learning in academic learning. In fact, Rovai and Jordan (2004) viewed blended learning as a method emphasising active learning through collaboration and social construction of understanding. This is also clear in the approach illustrated by Dzuiban, Hartman and Moskal (2004), where they described blended learning as a redesign of the instructional model involving:

- a shift from lecturing to student-centred instruction in which the students become active and interactive learners in both the face-to-face and the online components;
- increases in interaction between student-teacher, student-student and student-resources;
- integrated formative and summative assessment mechanisms.

Some authors suggest that blended learning may be an opportunity to change traditional learning pedagogies (Bonk and Kim, 2006; Schofield, 2006; Kozma and McGhee, 2003). Bonk and Kim (2006) suggested that in blended learning, the socialisation and learner-centred practices in the online setting induce a pedagogical shift in the face-to-face medium.

Findings from a study of four teachers, who taught separate online and face-to-face courses, by Scagnoli, Buki and Johnson (2009) suggested that the experiences acquired by teachers when teaching online, produced changes in the perceptions and understandings of online learning which may have resulted in changes to the face-to-face teaching practices. The researchers concluded that the transfer is more likely to occur when the teacher is satisfied with working in the online environment, and when there is similarity between content and context in the online and the face-to-face courses.

2.1.1.3 The effectiveness of blended learning

Bourne and Seaman (2005), and Vaughan and Garrison (2006b) argued that blended learning, if appropriately designed, is more effective than traditional classroom learning. Several comparison studies have been carried out to demonstrate the effectiveness of blended learning as compared to face-to-face learning and fully online courses.

Many studies contrasted fully online and face-to-face courses. Most indicated that learning outcomes for online students are similar to those of students in traditional classrooms (Bernard et al, 2004; Zhao et al, 2005; Talent-Runnels et al, 2006). Layton (1999) reviewed the work of Russell (1999) who had catalogued 355 studies from 1928 to 1998 and found no significant difference in terms of learner's success between face-to-face learning and learning using technology. Talent-Runnels et al (2006) reviewed several online courses and concluded (1) that learning in the online environment can be as effective as in traditional classrooms and (2) that online learning is affected by the quality of instruction. Moreover, some other studies have shown that learning outcomes for online students are superior (US Department of Education, 2009; Allen and Seaman, 2010; Goldman et al, 2003) to those of face-to-face learning.

Recent research (US Department of Education, 2009; Shea and Bidjerano, 2011) has shown that learners in blended learning courses outperform their counterparts in fully online and face-to-face classes. Blended learning in graduate courses has been reported to result in both student (Dzuiban, Hartman and Moskal, 2004; Moore, 2004; Albrecht, 2006) and teacher (Vaughan and Garrison 2006b, Bourne and Seaman, 2005) satisfaction in learning.

Dziuban, Hartman and Moskal (2004) looked at attrition rates and success in students' results in blended learning courses for a period of seven years and reported consistent findings which showed that blended learning increased student learning outcomes while it lowered attrition rates in comparison to fully online courses. They also provided evidence that blended learning was comparable to and in some cases more effective in learning than face-to-face courses. They argued that in blended learning the effectiveness and socialisation opportunities of the face-to-face class are combined with the active learning possibilities of the online environment.

Face-to-face classes in traditional teaching are generally characterised as passive (Petress, 2008); however, the face-to face setting seems to play an important role in blended learning processes. Conrad (2005, p.9) in a study of 17 adults in a two-year part-time blended master's course, found that when online learners had an opportunity to meet face-to-face, they reported 'an enormous surge in connectedness and satisfaction with the program design'. Garrison and Vaughan, (2008) argued that in blended learning, face-to-face interaction has significant advantages in the early stages of community building and in establishing trust to support collaboration. They viewed the face-to-face classroom experience in a blended learning programme as collaborative before it is reflective and saw its strength in its spontaneity; on the other hand, online learning is reflective before it is collaborative, with strength for opportunities for reflection and rigour.

Rovai and Jordan (2004) examined how a sense of community differed across fully traditional, blended and fully online courses. They provided evidence to suggest that blended courses produce a stronger sense of community among students than either traditionally or fully online courses. They suggested that the face-to-face component in the blend may compensate for some of the disadvantages of fully online courses (Rovai and Jordan, 2004). The latter can generate misunderstandings due to a lack of spontaneous interaction in asynchronous communication and of non-verbal social cues, such as facial expressions and voice inflection (Rovai and Jordan, 2004; Nyugen, 2010). Yet, the asynchronous online discussions promote reflective interaction which was

unlikely to happen in traditional face-to-face environments (Sengupta, 2001; Rovai and Jordan, 2004; Kirkwood and Price, 2005).

Rovai and Jordan (2004) argued that blended learning focusing on student centred approaches, interactivity between students, teacher, content and resource tools reduced the feeling of isolation which was thought to be the main factor (Haythornthwaite et al, 2000) responsible for the high attrition rates reported in fully online courses. In fact, Marino (2000) reported that students, in fully online courses, experienced difficulty in adjusting to the structure of fully online courses, in managing their time and in maintaining self-motivation. The face-to-face component in blended learning also reduced the frustrations and anxiety felt by online students who were less self-directed (Section 2.2.3) and needed frequent direction and instruction. The ALN report (2004) also suggested that blended learning alleviates feelings of isolation, anxiety and frustration in learners.

Heinze and Procter (2004) investigated blended learning settings in graduate IT adult part-time courses, and found that communication amongst students and between students and the teacher was a crucial element in the blended course. Communication was both a challenge and an enabler for facilitating a successful blended learning course. They presented a communications model which shows that most efficiency is achieved online on discussion boards, whereas maximum efficacy is achieved in the face-to-face class. Heinz and Procter (2004, p.8) argued that the former can be achieved through encouraging students to support each other through discussion boards, leaving the resolution of the more challenging issues to the face-to-face sessions with members of staff.

In a study of 723 college students, Shea and Bidjerano (2011) concluded that students in blended learning courses perceive their own learning as better and feel more effectively and socially connected to their peers as compared to fully online courses. They also found that the interaction levels significantly contributed to the learners' perceptions of social presence in terms of open communication. The authors had indications that the blended medium supported high levels of critical thinking.

Davis and Linn (2000) conducting studies which explored reflection, concluded that students who articulate their thoughts and confusions, are better able to note areas where their own understanding is lacking and to engage in knowledge integration. Garrison and Vaughan (2008) argued that, the online environment makes a permanent record of thinking.

> The reality of the face-to-face classroom is that much of the discussion becomes vapour. On the other hand, ironically, the written discourse of the so called 'virtual' online classroom offers permanency and perhaps more opportunity for reflection and rigorous thought.
>
> Garrison and Vaughan, 2008, p.48

The authors conclude that it offers an opportunity for further reflection and an increased awareness of an inquiry process. The next section discusses the pedagogic affordances of a VLE.

2.1.1.4 The VLE: A medium for interactions

According to Laurilliard (2002) a VLE is a space which in terms of learning, could provide anything which a real campus can provide. It is a store for databases, lessons and presentations, but more importantly it is

- a communicating medium with tools such as synchronous chat, asynchronous discussions, wikis and blogs;
- a collaborative medium for projects, problem solving activities, debates and discussions;
- an evaluating tool affording assessment for learning.

Thus, VLEs are environments which manage online interactions (Brown, 2010) and support networked learning, i.e.,

> Learning in which information and communication technology (C&IT) is used to promote connections: between one learner and other learners, between learners and teachers; between a learning community and its learning resources.
>
> Goodyear, 2001, p.9

Ainley and Armatas (2006, p.385) wrote that a VLE enables students to construct knowledge and understanding through 'posing questions, reacting to questions and ideas generated by other students, and reflecting on their ideas'.

It has the potential to make thinking visible and to scaffold the development of shared knowledge. Reviewing several studies regarding learning from VLEs, Ainley and Armatas (2006) concluded that motivational factors such as curiosity, interest, anxiety, enjoyment in working with others and achievement goals are important influences in the learners' responsiveness in the VLE.

Through technology such as the VLE, learners are provided with a vast range of opportunities for learning, communication and interaction. This implies that blended learning incorporating face-to-face learning and a VLE, affords a learning design with possibilities to cater for and to motivate students with different learning styles (Sankey, Birch and Gardiner, 2010).

The following section discusses the availability of technology and its appropriate use.

2.1.1.5 Technology and its appropriate use

As previously discussed in Section 1.2.5, the availability of technology does not guarantee its appropriate use in institutions. It is claimed that e-learning improves the quality of learning, access to knowledge and the development of learning skills (Alexander, 2001; Johnson and Dyer, 2005; HEFCE report, 2009/2012) and, transforms passive learners into active inquirers (Zhao, Lei and Conway, 2006; Petress, 2008). It was hoped that coupling technology with pedagogical concepts would create effective learner-centred environments which would enhance learning outcomes (Lynch, 1998; Mehanna, 2004).

An oft-repeated message is that technology is not to drive the pedagogy, but the latter must provide the lead (Fetherston, 2001; Bonk and Graham, 2004; Kirkwood and Price, 2005; Hung, Chen and Wong, 2006; De Freitas and Jameson, 2010). Studies have shown that some teachers use traditional teacher-centred practices in both the face-to-face and the online components of the blend (Jenkins and Healey, 2005, Armellini and Jones, 2008, Ertmer, 2005, Ertmer and Ottenbreit-Leftwich, 2010). McConnell (2000) and Taylor (2000) called for teachers and online learners to re-orientate themselves when they use technology-enhanced environments.

In a study by Webb and Cox (2004), it was found that the factors which affected pedagogical practices when teachers used technology were:

- the students' behaviours as influenced by their prior knowledge, beliefs and values;
- the teacher's pedagogical reasoning based on beliefs, values, ideas and knowledge;
- the teacher's belief about the value of technology for learning and knowledge about the affordances of the technology;
- the affordances of the technological tools.

Studies by Ertmer (2005), Luke (2006) and Lawless and Pellegrino (2007) indicated that the teacher's belief about the value of technology for learning was considered to be of prime importance in influencing pedagogical practices.

As indicated by Web and Cox (2004) and also by McConnell (2000) and Taylor (2000), the beliefs and values of online learners also contribute to pedagogical practices. Studies have shown that online learners require:

- to change many of their traditional learning expectations (McConnell, 2000; Taylor, 2000; Rolé, 2005);
- to understand that former successful learning approaches may not be effective for learning in the blended environment (Taylor, 2000);
- to relearn how to learn (McConnell, 2000);
- to stay actively engaged and connected during the course (Dzuiban, Hartman and Moskal, 2004).

The response of some students to technologically-enhanced learning is discussed further in Section 2.2.4.

Collaborative learning was meant to be the crux of the student experiences in this research. The next section provides a deep understanding of this learning process.

2.1.2 Collaborative Learning

In this research, I was concerned with studying the impact of collaborative learning design and process on the students' experiences and interpret the

students' experiences of collaborative activities. Thus, understanding the concept of collaborative learning had a great significance for my work.

2.1.2.1 A definition for collaborative learning

Collaborative learning is broadly defined as 'a situation in which two or more people learn or attempt to learn something together', (Dillenbourg, 1999, p.1). The term has been interchangeably used with co-operative learning, as both terms present a certain amount of overlap in their meanings (Borges and Baranauskas, 2003; Panitz, 1999). In fact, earlier work on collaborative learning tends to show less distinction between the terms (see Davies 1989, McConnell 2000; Johnson, Johnson and Smith, 1991). It is generally argued that in collaborative learning the focus is on the process of working together, whereas in co-operative learning, the focus is on the product (Myers, 1991, cited in Panitz, 1999). Other terms, including collective learning, peer learning, reciprocal learning, team learning, study circles, study groups, and work groups (Davis, 1993; Littleton and Hakkinen, 1999) are also used.

Rochelle and Teasley (1995, p.70) defined collaboration as 'a coordinated synchronous activity, that is the result of a continued attempt to construct and maintain a shared conception of a problem'. Collaborative learning, therefore, emphasises the shared understanding of a problem (Rogoff 1990; Borges and Baranauskas, 2003), the construction of meaning through interaction with others and a joint commitment to a shared goal (Littleton and Hakkinen, 1999; Benson, Noesgaard and Drummond-Young, 2001) These aspects are also highlighted by Salomon and Globerson (1989), Crook (1994), and Dillenbourg (1999) who add that the sharing results in a gradual growing interdependence of mental processes of the participating members.

Collaboration is an instructional strategy where group participants take part in a task, explore each other's ideas and negotiate the solutions (Scrimshaw, 1993; Biott and Easen, 1994; McCormick, 2004; Driscoll, 2004). Each member contributes, with the intent of improving the learning accomplishments of others and thus, the group's collective learning is greater than the sum of the parts (Driscoll, 2007). Within the group, there is a constant negotiation of roles and relationships (Edwards and Jones, 2003). Collaboration may also involve

social marking (Light and Perret-Clermont, 1990; Biott and Easen, 1994), where students learn in interaction with more knowledgeable peers. This will be discussed further in Section 2.1.2.3.

In the classroom, collaborative learning is a student-centered system where the task may be set by the teacher, but the authority, ownership, responsibility and control of learning are transferred to the group (Panitz, 1999; Mason 1994; Downing and Holtz, 2008). The teacher is available for consultation, to facilitate and assess the learning process. Bruffee (1995) remarked that for successful collaborative learning practices, the teacher's philosophy on learning becomes crucial.

In contrast, cooperation is viewed as any independent activity where students help each other but do not share mental processes to reach a common goal (Scrimshaw 1993; McCormick, 2004; Dillenbourg, 1999). Panitz (1999) and Downing and Holtz (2008) considered co-operative learning in the classroom as a structured and closely controlled teacher-centered system, where the teacher maintains control at each stage of the process by setting the problem, giving additional information, and guiding the students towards the end product. Brufee (1995) considered the two approaches as a continuum, and suggested that students become capable of collaborative learning after they have gained experience through co-operative learning.

2.1.2.2 Theories of learning

Well known learning paradigms used in the design of instruction include behaviourism, cognitivism and constructivism. One paradigm made way for another when anomalies arose and could only be solved by the development of another paradigm (Kuhn, 1962). Behaviourism and cognitivism, regard knowledge as external to the learner and the act of learning as an internalisation process. Behaviourists (Thorndike, 1913; Watson, 1913; Pavlov 1927; Skinner, 1940/1950) concentrated on the observable behaviour of organisms and environmental events and not on mental processes. Learning is considered as a change in behaviour in the learner. Behaviourism eventually led to developments of programmed instruction in textbooks, classroom teaching and computer managed instruction (Alessi and Trollip, 2001).

The prevailing view of cognitive development theories (Schuell, 1986) was that learning was basically an individual process, where an individual was motivated to undertake activities which produced individual results.

Bandura's (1977) social learning theory puts forward that people learn from observing one another, from the attitudes and from the outcomes of behaviours. In other words, learning occurs through modelling and imitation. This theory is often considered as the bridge between the behaviouristic and the cognitive paradigms as it encompasses brain function (cognitivism) in the formation of images which are later reproduced (behaviourism).

In constructivism, learners are actively constructing knowledge and creating meaning (Siemens, 2004). They construct their own subjective representation of objective reality, and the new information is linked to prior knowledge. Thus knowledge and understanding are not acquired passively, but in an active manner through personal experience and experiential learning (Von Glasersfeld, 1987; Fosnot, 1989; Driscoll, 2000).

Social-constructivist theories are variants of constructivism, where learning is viewed as a social process. Social constructivism is concerned with development not only of individual knowledge and meaning but of shared meanings within a community. The learning events involving collaboration, which formed the context of this research, are situated in the socio-constructivist paradigm. The next section discusses the theories which relate to collaborative learning.

2.1.2.3 A theoretical approach to collaborative learning

This section discusses different constructivist socio-theoretical approaches which underpin collaborative learning and the work of some researchers, e.g., Bruner (1971), Gunawardena (1997) and Lave and Wenger (1999), who also contributed to the understanding of collaborative learning theory. Dillenbourg (1999) discusses the socio-theoretical approaches as (1) a socio-cognitive approach, (2) a socio-cultural approach and (3) a distributed cognition approach. The socio-cultural and the distributed cognition approaches are about

a joint creation of knowledge as opposed to an individual creation of knowledge depicted in the socio-cognitive approach.

(i) A socio-cognitive approach

The socio-cognitive constructivist approach is based on Piaget's theory (1969) and focuses on the individual mind in a social context. Piaget perceived that development preceded learning, i.e., learners must be cognitively 'ready', before being able to perform certain kinds of tasks or achieve a particular understanding.

Piaget (1969) described knowledge as organised in complex cognitive structures called schemata. Peer collaboration in joint problem solving activities is seen in terms of creating and resolving cognitive conflict where the 'different views that individual peers bring to understanding an idea or concept create the conditions for each individual to rethink and construct understanding' (McCormick, 2004, p.163). Learners on different levels of cognitive development or learners on the same level with differing perspectives are able to engage in social interactions that lead to cognitive conflict (Lipponen, 2002). This creates a state of disequilibrium, i.e., a cognitive state of confusion, dissonance or discomfort. The individual adapts the new knowledge.

Adaptation includes assimilation which is the fitting of new knowledge in existing schemata and accommodation. This involves the adjusting of schemata to fit in the new knowledge. A given level of individual development allows participation in certain social interactions which produce new individual states which in turn make possible more sophisticated social interaction and so on. The promotion of individual learning through collaboration leads to individual construction of knowledge.

(ii) A socio-cultural approach

The socio-cultural approach is based on Vygotsky's (1896-1934) perspectives and focuses on social activity as the basic unit of analysis. Vygotsky's theory emphasises that all cognitive functions can be explained as products of social interactions. Learning is not simply an individual process, but the process by

which learners are integrated into a knowledge community. Vygotsky's social development theory argues that social interaction and learning preceded development. Learners internalize thought processes that occur through interaction with the social environment. Elementary mental functions are changed into higher mental functions with the use of mediators such as language and other symbols. Vygotsky believed that affect and intellect are two mental functions which are inseparable (Levykh, 2008).

Vygotsky (1978) describes two developmental levels to explain the internalisation process: (1) the level of actual development, which is the level at which the learner is capable of solving problems independently and (2) the level of potential development which is the level that the learner is capable of reaching under the guidance of teachers or in collaboration with peers. The zone of proximal development (ZPD) is the distance between a student's ability to perform a task under an adult's guidance or with peer collaboration and the students' ability of solving the problem independently.

In the context of this research, the concept of the ZPD can be applied both to students interacting in joint problem solving tasks and also to students solving problems with the help of the teacher or more knowledgeable peers. In both cases, the learner or learners use mediating tools (language, the more knowledgeable peer or the problem solving partners) to achieve higher mental functions to form new psychological systems – neoformations (Levykh, 2008). These systems become internalized and part of the learners' 'independent developmental achievement' (Vygotsky, 1978, p.90). The ZPD shows the developmental stage which the learner had, the stage that the learner achieves with assistance and a vision of the next stage which the learner can achieve with further assistance. The greater the learner's ZPD, the greater is the learner's potential for learning and the greater is the learner's opportunity to benefit from collaboration (Levykh, 2008).

Levykh (2008, p.125) interpreted Vygotsky's notion of the ZPD as 'a synthesis of intellectual and emotional functions - a zone of intellect and of positive emotions from all the concerned parties.

> For Vygotsky, the question is not how a learner behaves in a group, but how the group creates mental functions in a learner.
>
> Levykh, 2008, p.125.

The more knowledgeable students exhibit care and emotional openness about the students' learning. Consequently, the learners develop trust, interest, appreciation and enthusiasm regarding the subject. The learners' positive relations allow them to feel safe to pose questions, to trust the knowledge-mediators and to develop an interest in the subject. A safe and emotionally positive collaboration in the ZPD pushes the learner's further intellectual and emotional development towards its highest level. Thus affective engagement maintains a successful and dynamic ZPD, and is a critical motivator for learning.

Similar to Vygotsky (1978), Bruner (1971) emphasised the importance of social factors in cognitive development especially the role of language, social interaction and experience. Bruner (1985) views learning through social support in terms of 'scaffolding". One learner develops his understanding with the help of someone who is more knowledgeable. Eventually the learner will become more competent and may not require any more scaffolding in the circumstance. Light and Perret-Clermont (1990) used the term social marking to describe the learning occurring when a student interacts with other learners who are more knowledgeable.

(iii) The shared or distributed cognition approach

This focuses on the social plane, where emergent conceptions are analysed as a group product (Dillenbourg et al, 1996). A group forms a single cognitive system. Dillenbourg et al (1996) explain that this approach is 'deeply intertwined with the situated cognition theory (Lave 1988; Brown, Collins and Duguid, 1989) where the environment with both a physical and a social context is an integral part of cognitive activity.

Lave and Wenger (1991) presented the Community of Practice concept as a process of social learning which occurs when people have a common interest in a subject, collaborate over a-period of time, share ideas and strategies, solve problems and build innovations. When people talk to each other they share

images and perceptions and negotiate meanings. As a result of this they may reach consensus as to what they believe or understand.

Lave and Wenger (1991) elaborated on social learning and put forward the notion of legitimate peripheral participation (LPP), where novice learners initially stay at the periphery of the negotiation table to learn from the old-timers at the core of the community. According to Lave and Wenger (1991, p.95) 'an extended period of legitimate peripherality provides learners with opportunities to make the culture of practice theirs'. Lave and Wenger (1991) describe a learning community of practice as a 'triadic' set of actors: newcomers, persons who are relative old-timers to newcomers, and old-timers, who have been there for longer periods. Novices learn at the peripherality and gain knowledge and experience (Lave and Wenger, 1991). As they become more competent they move towards the centre of the community and gradually undertake the responsibilities of the professional (Fairbanks, Freedman and Kahn, 2000). Learning is thus a process of *social* participation. Wegerif (1998) proposes a conceptual framework applied to asynchronous conferencing where successful students move from feeling outsiders to insiders in a learning community. Some students find the threshold difficult to cross. Teachers or more knowledgeable peers model behaviour, provide support, and draw in the students feeling as outsiders to the community.

Gunawardena, Lowe and Anderson (1997) investigated and analysed group interactions. They concluded that in collaborative learning, knowledge is constructed within the group by means of exchanges among participants. The participants create new personal constructions of knowledge as a result of interactions within the group. The researchers compared the process to a patchwork quilt: the contributions by each participant during the learning experience formed the patches, which were held together by 'interactions'. The pattern of the whole quilt represented the co-constructed knowledge. The knowledge or pattern on the quilt existed regardless whether parts of it or all of it was assimilated by each participant. Finally, although co-construction of knowledge occurred involving all participants, participants took their individual construction of the pattern which reflected the pattern established in the whole quilt.

2.1.2.4 From individual learning to CSCL

According to Driscoll (2004), online collaborative learning promises to turn passive participants into active learners as collaboration can overcome many of the complaints of boredom and loneliness. Combining online and collaborative learning results in meaningful, collaborative and cross-cultural interactions (Liu, Lavelle and Andris, 2002), offering students opportunities for a socio-constructive approach to learning. Online collaborative learning in the form of asynchronous discussion-based learning and problem solving activities offers several advantages. It breaks the physical and time restrictions of college due to the anytime, anyplace usage (Driscoll, 2002; Lipponen, 2002; Hiltz and Arbaugh, 2003; Al-Mahmood, 2006; Goodyear, 2006). As discussed in Section 2.1.1.4, the asynchronicity of the e-tools allows students to reflect on their ideas and those of other students. It allows sharing of resources and students are able to discuss and resolve their conflicts through zones of proximal development which become established. The medium serves as a depository of ideas and can function as a collective memory for a learning community, recording the history of knowledge construction processes for revision, further reflections and for future use (Lipponen, 2001; Garrison and Vaughan, 2008).

There is evidence that despite the benefits and advantages of collaborative learning and online learning, computer-supported collaborative learning (CSCL) has encountered problems. Some of these were mentioned in Section 1.2.5. Students have also offered resistance to learn through CSCL. This is discussed in Section 2.2.1.

2.1.3 A model for blended learning

Clark et al (2008) remarked that benefits from the use of new technologies are enjoyed when they are implemented in course designs and aligned with cognitive learning processes. Models for online collaborative learning or blended learning proposed by several authors point to the importance of community building strategies as much as to the cognitive aspects of the course (Salmon, 2000, 2002; Garrison, Anderson and Archer, 2000 ; Palloff and Pratt, 2009; Lehmen and Conceicao, 2010; Rovai 2002; Heinze and Procter, 2006; Tsai et al, 2008).

Garrison, Anderson and Archer (2000) developed a conceptual model called the 'Community of Learning and Inquiry model' for asynchronous online discussion. This model supports the formation of a learning community, and postulates that deep and meaningful learning results when there are sufficient levels of three component presences: social, cognitive and teaching presences. Garrison and Vaughan (2008) applied this model to blended learning (Figure 2.1). Shea and Bidjerano (2011) used the Community of Inquiry model to understand and compare the value of the presences in blended and fully online environments. Each of these presences, also considered crucial for learning by other authors, e.g., Vygotsky (1978) (See Section 2.1.2.3), Salmon (2000), Palloff and Pratt, (2007), Pelz (2004) are discussed below.

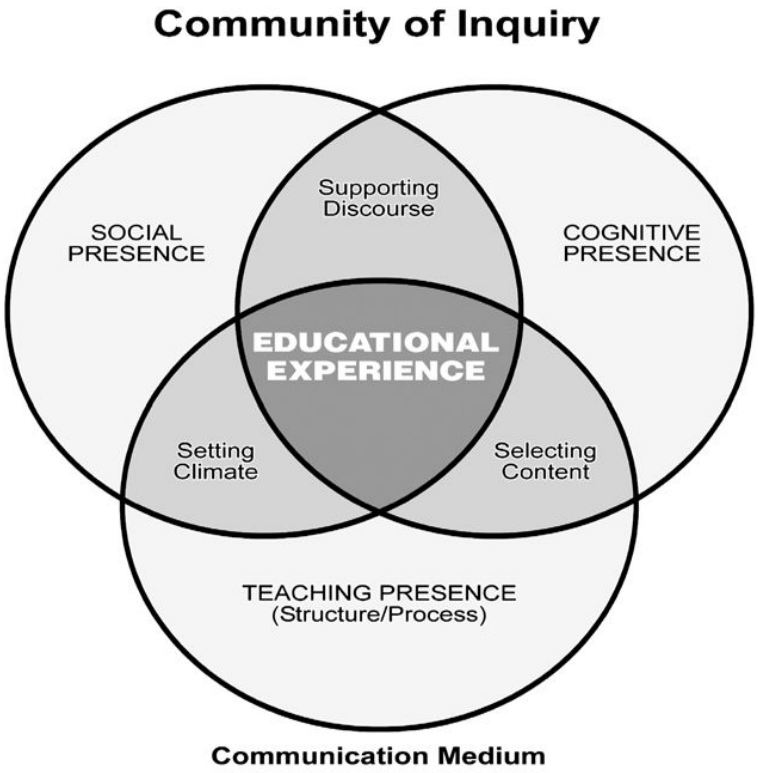

Figure 2.1. Community of Inquiry Framework. *Source: Garrison and Vaughan, 2008, p.18.*

2.1.3.1 Social Presence

In Section 2.1.2.3 (ii), I discussed Vygotsky's notion that emotions are crucial to establish and maintain the ZPD. Levykh (2008) remarked that it is crucial to establish an encouraging and trusting emotional environment at the beginning of the learning process. Current studies confirm the concept of social presence as a critical element in online community building which ensures a safe and comfortable place for learning – a place where students are able to express themselves socially and emotionally (Garrison and Anderson, 2003; Palloff and Pratt, 2007; Caspi and Blau, 2008).

Short et al (1976) defined social presence as the degree of salience between two persons using a communication medium; the attributes of the online medium were thought to determine the degree of developed social presence. However, Gunawardena (1995), Garrison, Anderson, & Archer (2000), Preece (2000), Palloff and Pratt (2009) argued that the online medium provides only the affordance for socialising and that participant behaviour has a greater impact on the development of social presence than the medium. The participants themselves create a social space with a sense of belonging to the online community (Gilroy, 2001). The extent of social presence depends on the extent of interaction and vice versa (Stein and Wanstreet, 2003; Shea and Bidjerano, 2011). Caring relationships are promoted as learners post personal stories, caring talk and humour (Comstock and Fox, 1995).

Palloff and Pratt (2009) described social presence as the ability of a person to feel as a real person in the online environment. Garrison et al (2000, p.94) added more detail, describing it as the ability of students to project themselves 'socially and emotionally', in the online setting.

In the 5-stage model (Figure 2.2) for asynchronous online discussion-based learning Salmon (2000, 2002) indicated the importance of socialisation, placing it at the second stage after familiarisation with the technology tool. It is one of the foundation steps for online learning interactions. The same stages were also identified by Bermejo (2005) in an online artificial neural networks course in electrical engineering.

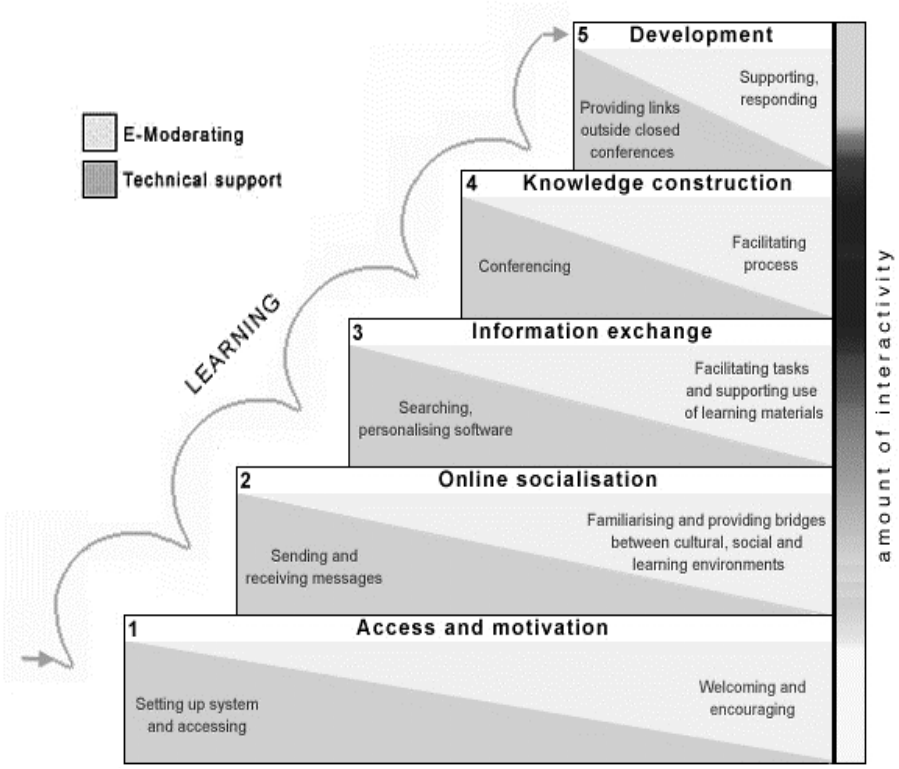

Figure 2.2. The 5-stage model for asynchronous discussion (Salmon, 2000) *Source: Heinz and and Procter, 2004, p.2*

Different authors focussed on different aspects of social presence, namely affective, cohesive, open communication, interactive and psychological (Table 2.2). Garrison (2006), Pelz (2004) and Lehmen and Conceicao (2010) view social presence from three perspectives, and all three give importance to the affective and the cohesive aspects as elements of social presence. The affective aspect of online presence is indicated by the student's ability to show feelings through words, symbols, and interactions whereas the cohesive aspect is indicated when learners feel a connecting experience with others and a sense of belonging to the community. Garrison (2006) considers open communication which reflects a will to trust. This is indicated by risk-free expressions. Pelz (2004) gives importance to an interactive aspect which is indicated by acknowledging the postings of other students, whereas Lehmen and Conceicao (2010) consider a psychological aspect. This is indicated by a high sense of telepresence (Kiousis, 2002) or involvement (Ijsselsteijn et al, 2000), where the learner forgets that he is sitting in front of a desk, but projects himself into the

virtual community. The technology becomes transparent to the user (Lombard and Ditton, 1997).

Table 2.2. The different aspects of social presence

Authors	**Aspects of Social Presence**				
	affective	cohesive	Open communication	Interactive	Psychological
Garrison (2006)	✓	✓	✓		
Vaughan and Garrison (2006)	✓	✓	✓		
Pelz (2004)	✓	✓		✓	
Lehmen and Conceicao (2010)	✓ emotional	✓ social			✓
Palloff and Pratt (2009)	✓			✓	✓

Palloff and Pratt (2009) touched on the affective, interactive and psychological elements when they described the portrayal of the online real person as a learner able to create a mental picture of the other learners and to deal with emotional issues in textual form in the online environment.

Vaughan and Garrison (2006a) investigating social presence in a blended course for professional adults, found that the frequency of affective and open communication comments decreased, while group cohesion comments increased as the course progressed. Affective and open communication was initially necessary to establish a sense of community, but eventually, the group became more focused on purposeful activities.

Social presence is a crucial element in online collaborative contexts and has to be established at the early stages of a course (Salmon, 2000; Palloff and Pratt, 2009). It helps the group to coalesce around a common goal and in this way the

community sustains itself. Since, it creates the conditions for inquiry and quality reflective interactions (Garrison, 2006), it is necessary for the existence of the teaching and cognitive presences.

2.1.3.2 Cognitive Presence

Kanuka and Garrison (2004) defined cognitive presence as 'the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry'.

According to the above authors, cognitive presence could be visualized as the exploration, construction, resolution and confirmation of understanding through collaboration and reflection. The indicators for cognitive presence are a sense of puzzlement, which trigger a search for information and understanding. This is followed by information exchange, connecting ideas and application to new ideas (Kanuka and Garrison, 2004). In the five-stage model (Salmon, 2000) (Figure 2.2), cognitive presence becomes evident in Stage 3, where information exchange between students occurs and becomes established, in Stage 4 where knowledge is constructed and in Stage 5, where students apply what they have learnt together in creative contexts.

2.1.3.3 Teaching Presence

Garrison, Anderson and Archer, 2000 referred to teaching presence as 'the design, facilitation, and direction of cognitive and social processes for the purpose of realising personally meaningful and educational worthwhile learning outcomes'. Some authors referred to teaching presence as the voice of the facilitator (Lehmen and Conceicao, 2010). Pelz (2004) noted that both the teacher and the students can increase teaching presence by facilitating the discussions and by direct instruction. The former includes identifying areas of agreement or disagreement, seeking to reach understanding, encouraging, acknowledging, reinforcing student contributions, drawing in participants into the discussions and prompting discussion. Direct instruction implies presenting content and questions, focussing and summarising the discussion, confirming understanding, diagnosing

misconceptions and adding knowledge from diverse sources. In an online course, creating the conditions to maintain teaching presence is a continual process. This ensures the postings of reflective discussions and interactions.

As discussed above, the online component of a blended learning programme affords a social environment which supports learning if social, cognitive and teaching presences are established. These presences develop in the online setting and are established more quickly in a blended learning context, due to the presence of the face-to-face medium (Garrison and Vaughan, 2008). The effect of the face-to-face component in a blended learning context has been discussed in Section 2.1.1.3.

Part 1 provided me with an understanding of blended and collaborative learning. Evidence exists that blended learning has the potential to be more effective for learning than fully online or face-to-face learning. A pedagogy founded on socio-constructive principles is considered to be appropriate for online learning. Meaningful learning in the online medium depends on the levels of social, cognitive and teaching presences. Social presence is a crucial element which needs to be established at the early stages of a course to set the context for the development of both cognitive and teaching presences. Part II focuses on the online and collaborative learner.

Part II

2.2 Students' experiences, characteristics, skills and online persistence

Part II explores the literature on the students' responsiveness to online collaborative learning - their acceptance of the innovation, their online characteristics and skills, their online experiences and behaviours and models revealing factors which affected their online participation. The literature on research concerning the learning characteristics of students studying in fully online courses is extensive. On the other hand, the literature concerning students in blended learning contexts, especially college students who are in a transition phase between secondary and university education is scarce.

2.2.1 The Digital Natives at college

This section addresses the literature regarding research question 1.1 and looks at the online behaviour of learners.

It is claimed that teenagers are digital natives (Prensky, 2001) and they are described as digitally literate, connected, immediate, experiential and social (Brown, 2002; Oblinger and Oblinger, 2005; Tapscott, 2009; Palfrey and Gasser, 2008)). It might be expected that teenagers would prefer online technology for learning. Technical advancement, such as broadband connectivity, browser technologies, development of e-tools and media has meant a shift from reading, receiving and researching (Web 1.0), where Internet users were mainly an audience, to contributing, collaborating and creating (Web 2.0) (O'Reilly, 2005). Hence, learners have opportunities not only to be receivers, but also producers and distributors of knowledge (Lorenzo, Oblinger and Dziuban, 2007). However, later studies have shown that the majority of Internet users make use of the Internet to access information and to communicate via social networking and not to participate in content creation activities as claimed and expected (Bennett and Maton, 2010). Some authors, e.g., Rojas (2004) and Bennett, Maton and Kervin, (2008) argued against associating digitality with teenagers. Rojas (2004) attributed digitality to a person's techno-disposition.

Bullen, Morgan and Qayyum (2011) conducted a study of 69 Canadian postsecondary students and consistent with several other researchers, e.g., Bennett et al (2008); Jones and Cross (2009); Kvavik (2005); Margaryan and Littlejohn (2008) (all cited in Bullen, Morgan and Qayyum, 2011, p.1), Bullen, Morgan and Qayyum (2011) concluded that there are no meaningful differences between Net-generation and non-Net generation students in terms of willingness to use technology for study.

It has been reported that when offered a choice, teenager students preferred traditional face-to-face learning, rather than online learning (Jefferies, Quadri and Kornbrot, 2006; Pedro, 2010). In a study by Sweeney, O'Donoghue and White (2004) on the perspectives of 12 undergraduates about the use of face-

to-face or online discussion board teacherials which they experienced, the students considered the former as more important for their learning.

A study of 31 HE students by Jefferies, Hyde and Bullen (2008, p.473) revealed that although students were relying heavily on technology in their daily lives, some students showed 'a shallowness' in their competency of using technology to support their learning. In addition, various studies showed that students in a traditional classroom tended to resist learning with the use of computers and online learning environments, irrespective of the potential learning benefits of using the technology (Akerlind and Trevitt, 1995; Guzdial et al, 2001; Roskowsk, Felder and Bullard, 2002; Zhang et al, 2004). Lohnes and Kinzer (2007) investigated students' expectations of technology in a liberal arts classroom and were surprised to find a strong resistance for the use of technology in the classroom. Furthermore, a study involving 17,000 medical students (JISC 2012) also showed that the students were not generally keen on using technology within their courses.

In online collaborative learning students may resist online participation or the collaborative aspect of the learning mode. Students may not want to add workloads and learn how to engage with the online environment. Online learners who prefer to work on their own do not favour collaboration; they may have had negative past experiences of working with an unproductive peer, or having had to do more than their fair share of the workload, or having received a low grade which they felt they did not merit (Brindley, Walti and Blaschke, 2009). In such cases, online collaborative learning is visualised as a burden rather than conforming to the dictum learning anytime, anyplace (Section 2.1.2.4).

Online collaborative learning was an innovative mode of study for the learners in this research. The next section discusses the innovation-decision process.

2.2.2 Online collaborative learning as an innovation

Rogers (2003) described an innovation as an idea, concept, object, tool, procedure or practice that is perceived as new by an individual. Individuals perceive an innovation differently, and may adopt the innovation, if at all, at

various different stages in the diffusion process (Soffer, Nachmias and Ram, 2010). Rogers (2003) described the innovation-decision process in five stages.

> The innovation-decision process is the process through which an individual passes from gaining knowledge of an innovation, to forming an attitude toward the innovation, to making a decision to adopt or reject, to implementation of the new idea and to confirmation of the decision.
>
> Rogers, 2003, p.168.

At the knowledge stage, the individual becomes aware of the innovation and gains an understanding of its functions. At the second stage, which is the persuasion stage, the individual forms a positive or a negative attitude towards the innovation. Perceived attributes such as benefits, complexities and compatibilities determine the third stage which is the decision stage. At this stage, the individual may accept or reject an innovation. Acceptance is followed by the implementation stage, where the innovation is put to use. At the confirmation stage, the individual seeks reinforcement for the decision. Adoption may be temporary and in this case, discontinuance will end the decision-innovation process.

The innovation may be rejected at the third stage. Yet, rejecters may become late adopters and the innovation-decision process continues with the implementation stage. Therefore, individuals exposed to innovations may be early or late adopters or discontinued adopters or rejecters (Rogers 2003).

Akerlind and Trevitt (1995) maintained that a technological innovation involves a process of change which is prone to produce stress. They added that if this change is not managed well, the innovation would not be accepted, or if it is accepted, the learning process would be inhibited. The stressful circumstance is discussed further in Section 2.2.4.2.

The following section focuses on the literature which concerns research question 1.2, i.e., the factors which influence online behaviours and participation.

2.2.3 Models of barriers to online participation

Literature seems scarce on persistence of college students who participate in the online component of a blended learning course. Nonetheless, retention of students in courses has been an ongoing concern for educators (Berge and Huang, 2004), and a considerable amount of literature is available on persistence of adult and higher education students in fully online courses. Several models have been put forward to help institutions plan interventions to address attrition. The broad categories in some of the models may be applied to the college learners in this research.

Tinto (1975) considered academic and social integration influenced by pre-entry personal attributes, e.g., skills, abilities and goal commitments as the deciding factors for students to persist in a distance education course. Boyles (2000, cited in Berge and Huang, 2004) presented a model focussing on three cluster variables which were (1) background and defining variables including maturity, personal circumstances and previous experiences, (2) environmental variables, e.g., family and work commitments and (3) academic variables including the learner's prior knowledge and perception of the difficulty level of the subject. This model was refined by Berge and Huang (2004) who included variables from several other retention models. They also re-arranged the variables into three clusters of factors, namely:

- Personal variables: age, gender, ethnicity, socioeconomic status; parental educational level, parental expectation; academic skills and abilities, learning strategies, motivation, task value, self-efficacy; and prior educational experiences;
- Institutional variables: organizational characteristics, attitude, values and beliefs; academic characteristics like structural and normative systems and integrations, social characteristics and integration between the individual student and the social system of the institution;
- Circumstantial variables: academic, social, institutional and non-institutional interactions; life, work and family circumstance and perceived stress, responsibilities, and levels of satisfaction.

Berge and Muilenburg (2005) analysed 1056 valid responses from college age students and older students in various institutions and identified eight factors in an investigation of the students' perceptions on barriers to online learning. These factors, which were of a situational, institutional and personal nature are listed in order of priority (with the most critical first): social interactions, administrative and instructor issues, learner motivation, time and support for studies, technical problems, cost and access to the Internet, technical skills, and academic skills.

Rubenson (1986) classified impediments to participation in distance courses, into situational, institutional and dispositional barriers. Garland (1993) added epistemological issues as another barrier. The four constructs in the Garland (1993) model, are listed below:

- Situational barriers are those which occur as the result of changes in the social, economic or personal life of a student such as family support, employment status, educational status, health, financial status and time constraints. The institution has no control over situational factors;
- Institutional barriers relate to factors which concern the quality of a course e.g., teacher's planning, preparation and delivery, class size, term length issues, class schedules;
- Dispositional barriers arise from an individual's background and includes issues such as motivation, attitudes, self-confidence, learning styles and competency;
- Epistemological barriers result from problems with academic matters, prerequisite knowledge and expectations.

The above mentioned different authors listed similar factors and categorised them under different headings, which included personal, circumstantial (situational), institutional, academic integration, social integration, dispositional and epistemological. The literature which informed this section was useful to help me construct a model for the analysis and discussion of the factors which affected online participation in my research (Section 5.2). Gibson (1998), Diaz and Cartnal (2006) and Stanford-Bowers (2008) considered the

Garland (1993) model in their studies. However, they individually focused on different factors which affected online participation.

Gibson (1998) showed that academic self-concept played a role in persistence. Diaz and Cartnal (2006) looked at term length as an institutional factor and found that students attending short term courses had greater success rate and a reduced drop-out rate. Stanford-Bowers (2008) investigated the perceptions of online student persistence factors of three stakeholders: administrators, lecturers and students. The perceptions of administration and lecturers for student course completion were of an instructional and institutional nature, whereas the students' perceptions were of a personal nature. The administrators ranked student self-discipline and prompt teacher feedback, whereas the lecturers ranked clear instructions and student self-motivation as the most significant factors. In contrast, the students ranked convenience, flexibility and time management as factors that mostly influence online course completion.

Section 2.2.3 looked at models of barriers or persistence for distance or online learning. Section 2.2.4 presents a review of the literature on several of the factors which affected online participation at the individual student level.

2.2.4 Online and collaborative student experiences

In Section 2.1.1.3, I referred to studies which showed that learners in blended learning contexts experienced a sense of community, connectedness and satisfaction in their learning, and made references to studies of fully online courses where learners experienced difficulties with coping with course structure, time-management and motivation, and expressed, anxiety due to feelings of isolation. This section reviews further learner-focused studies concerning the learners' abilities to cope in the online collaborative settings. Although most of the studies in the literature concern fully online courses, they helped me relate to and understand the students' experiences in my research. Similar to Section 2.2.3, this section informs the research question 1.2. It discusses the affect of prior learning experiences, of emotional states and of possession of collaboration skills on online participation.

2.2.4.1 The effect of prior experiences of learning

Past experiences and prior conceptions of traditional learning influence the performance of students (Prosser and Trigwell, 1999) participating in a course with innovative learning approaches (Mitchell and Honore, 2006). Students may start the course with traditional learning expectations (McConnell, 1994; Taylor, 2000; Rolé, 2005). They need to re-orientate themselves (Section 2.1.1.5). Mitchell and Honore (2006) found that the initial impressions, attitudes and motivation of students regarding the use of the online component of the blended programme, affected online learning behaviour. Sharpe et al (2005) gave an extensive review of past studies regarding the students' experiences of e-learning.

Studies revealed that learners use traditional learning methods that are familiar to them in the online environment (Beasley and Smyth, 2004). The students rely on learning from their teacher (Beekes, 2006; Benson, Noesgaard and Drummond-Young, 2001), and hence, consider content which is posted online by peers as unreliable (Sweeney, O'Donoghue and Whitehead, 2004). It was found that some students considered only the teacher as the person of importance in the online setting and addressed their postings to the teacher ignoring the whole class (Crook, 2002; Hammond, Trapp and Bennett, 2002). In other studies, students who were expected to use the web to download information and notes (Crook, 2002; Pedro, 2010), preferred to study linearly and to use printed paper-based materials (Beasley and Smyth, 2004). The study by Sweeney, O'Donoghue and White, 2004 revealed that the students viewed online teacherials as hard work requiring reflective thinking and time commitment, when compared to face-to-face teacherials.

Salmon, (2000), Nunes and McPherson (2002) and Lomas and Oblinger (2006) remarked that students who are generally proficient with technology do not necessarily have the ability to learn online. Bonello Cassar (2012) found that 70% of Junior College students (response rate 40%) were confident users of technology, and yet they used the VLE solely to download notes. Nonetheless, in the case of the Junior College, the student survey results, as reported by

Bonello Cassar (2012), reflected the teachers' inappropriate use of the VLEs (Section 1.2.5).

2.2.4.2 Emotional experiences

In a study of 75 online MBA students over a period of three years, Mitchell and Honore (2006) found that both acceptance and motivation to use online collaborative learning methods took time to be established. Students could be unaware of the demands of online learning and need to develop a conception of online learning and understand their roles as online learners (Palloff and Pratt, 2001; Laurillard, 2002). Palloff and Pratt (2001) insist that students need to learn how to learn online, and until this happens, online participation could become for some students an emotional experience (Sharpe et al, 2005; Cramphorn, 2004; Zhang et al, 2004; Hara and Kling, 2000; Juutinen and Saariluoma, 2010) with highs and lows as peers relate (or not) to one another, try to manage time and electronic resources and keep up with discussions (Sharpe et al, 2005). The frustrations, confusion and loss of interest are emotional states which interfere with further online participation (Zhang et al, 2004; Hara and Kling, 2000**;** Cramphorn, 2004). In a study of 8 undergraduates in a face-to-face course, Taylor (1986) documented the disorientation which the students faced as anxiety, confusion, tension and loss of self-confidence. Referring to online learning Beekes, (2006), Ramsay (2003) and Sweeney, O'Donoghue and Whitehead (2004), wrote that due to a lack in self-confidence, learners may lose interest and also show a reluctance to discuss in the online class.

The frustrations may be due to the collaborative element, the use of the online medium or due to a combination of both. Brown Fiechtner and Davis (1984, p.87), who conducted a survey regarding the non-functioning of face-to-face collaboration with communication and business undergraduates, wrote that students leave 'the classroom experiencing only the frustrations of group-work and not the numerous benefits possible through team effort'.

Macdonald (2003) reported that students display states of uneasiness when they need to critisise or to edit their peers' contributions. Biott and Easen (1994) found that emotional conflicts arose due to attitudes of perceived dominance,

power differentials or intellectual conflicts which do not get resolved. In addition, the lack of visual expressions and verbal cues in the online medium may hinder the resolution of emotional conflict (Section 2.1.1.5).

2.2.4.3 Collaboration skills

Hérbert and Bravo (1996) developed a 44-item evaluation instrument to investigate small group performance of medical students in teacherials. 270 student evaluations resulted in the identification of four main factors, important for learning: group effectiveness, which included the ability to master the learning method, communication and leadership, scientific curiosity and respect for colleagues. As discussed in Section 2.2.4.2, learners may show reluctance to discuss or constructively criticise in online fora. Alexander, Willocks and Kinder (1989), Harland (1990) and Somekh (1991) in studies involving collaboration found that lack of negotiating skills and enquiring techniques were problematic issues. McCormick (2004) analysed the collaborative processes of two students who collaborated via video conferencing, and found that students need to learn how to resolve issues, to explore the mental states of each other and to learn to identify the decisions which are appropriately taken individually or collectively.

2.2.4.4 Extreme behaviours

As discussed in Section 2.2.2 individuals perceive innovations differently (Rogers 2003). Indeed, Mason and Weller (2000) and Sweeney, O'Donoghue and Whitehead (2004) noted the following extreme variations in the learners' response to online learning:

- some students felt free to contribute without fear of criticism whereas others felt vulnerable to criticism especially due to the permanency of the postings;
- some students appreciated that working online allowed them to reflect more and posted articulated responses whereas others expressed concern that online work was unnecessarily time consuming;

- some students viewed the discussion board as offering deep learning and freedom of speech requiring reflection and time whereas others viewed it as hard work;
- some students appreciated self-directed learning and group work whereas others expected to find model answers from the teacher.

Studies by Ellis and Calvo (2004) indicated that variations in learners' behaviours related to students' understanding of their learning and the role of the online environment and its activities. They contended that although teachers provide opportunities for meaningful discussions, learners are not always able to engage in them.

This section has shown that some learners experience difficulties coping with the online collaborative medium. The community building strategies, e.g., the affective engagement described by Vygotsky (Section 2.1.2.3) and the establishment of social presence (Section 2.1.3.1)), have the potential to reduce these difficulties.

In the next section, I discuss the characteristics of learners which according to researchers are considered to be necessary for online collaborative learning.

2.2.5 The online collaborative learner

This section looks at the literature which addresses the research question 2.1: How did online participation change the students as learners. Anderson and Garrison (1998) stated that a successful online learner is one who is able to interact with the community, subject content and technology. Educators have speculated on the development of student skills which are necessary for an online collaborative experience (Roper, 2007). The compilation of a profile of the successful online learner and the understanding of the nature of online learner characteristics and behaviours are of great value to improve learning and teaching (Thompson, 1998). Dabbagh (2007) argued that the profile of the online learner is constantly changing, in response to the rapid technological innovations and new learning paradigms, but described the emerging online learner as

> someone who has a strong academic self-concept; is competent in the use of online learning technologies, particularly communication and collaborative technologies; understands, values, and engages in social interaction and collaborative learning; possesses strong interpersonal and communication skills; and is self-directed.
>
> Dabbagh, 2007, [Online]

2.2.5.1 An emerging online learner

This section discusses the following characteristics of an online learner:

- technical skills;
- favourable attitudes and dispositions;
- an ability to be a collaborative learner;
- an ability to be a self-directed learner.

(i) Technical skills

In a national survey in North America by Guglielmino and Guglielmino (2003) and in another study by Bernard et al (2004), it was found that the two most important aspects of online learning readiness are technical competence and the ability to be a self-directed learner. The former, which includes being able to manage the Internet, the computer and communication techniques is not considered to be as crucial as self-directedness; technical management is a skill that can be learnt and mastered. On the other hand, self-directed learning is a lifelong skill which needs to be developed (Taylor, 1995; Guglielmino and Guglielmino, 2003; Guglielmino, 2008; Section 2.2.5.1,iv).

(ii) Favourable attitudes and dispositions

Successful online learners believe in the effectiveness of online collaborative learning and have a positive perception and a favourable attitude towards the use of online media and collaboration for learning (Bernard et al, 2004; Akerlind and Trevitt, 1995; Laurillard, 2002, Palloff and Pratt, 2001). Biott and Easen (1994) said that when learners value learning together, they create favourable conditions for collaboration. Other essential learner characteristics are the dispositions related to the development of an online learning community. Bernard et al (2004) listed a readiness to interact with the online

community, to give timely feedback and to support other students. Palloff and Pratt (2003) gave importance to a readiness to be open, flexible and honest, to work collaboratively with others, and to take on the responsibility for community formation. Learning dispositions eventually became one of the key issues in the discussion in this research (Section 5.5.4) and a review of the literature on learning dispositions is presented in Section 2.3.1.

(iii) An ability to be a collaborative learner

Some researchers found that for effective collaborative learning, learners need to be prepared for collaboration. They need to know the purpose and benefits of online collaborative learning (Tu and Correy, 2003), and to learn about collaborative strategies such as, active and tolerant listening, helping one another, giving and receiving constructive criticism, and managing disagreements (Davis, 1993; Biott and Easen, 1994).

As already discussed, they also need to learn how to resolve issues and explore the mental states of other learners (McCormick, 2004; Biott and Easen, 1994). Smith and MacGregor (1992) remarked that collaborative learning demands that students show responsibility, persistence and sensitivity.

Collaborative learners require strategies to cope with emotional states such as frustrations and conflicts (Section 2.2.4.2). Emotional conflicts are dealt with strategies of organizing, supporting and commenting (Burden et al, 1988). Conflicts giving rise to challenging debates, and which are eventually resolved, are a positive and an integral component of collaborative relationships (Biott and Easen, 1994). These conflicts necessitate strategies of asking questions, suggesting alternatives, explaining (Burden et al, 1988), defending ideas (Driscoll, 2004), and analyzing possibilities instead of using tactics of dominance, assertion and counter-assertion (Biott and Easen, 1994).

(iv) an ability to be a self-directed learner

Self-directed learning is a lifelong skill which is crucial for online learning and which needs to be developed (Taylor, 1995; Guglielmino and Guglielmino, 2003; Guglielmino, 2008). The possession of an internal locus of control (Rotter, 1966; Thompson, 1998; Martinez, 2003), and agency (Stets and

Harrod, 2007; Holland et al, 1998; Biesta and Tedder, 2006) are concepts which overlap in meaning with self-directedness.

An internal locus of control is a term originally used by Rotter (1966) in psychology and refers to a belief that the performance outcome is the result of students' own behaviors and efforts and not directed by external forces such as luck or technical issues (Rotter, 1966). Wang and Newlin (2002) reviewed some studies which investigated the correlation of learner characteristics with performance in online settings. From their investigations, they concluded that locus of control is the only trait, which moderately correlates with performance in online settings. Since students with an internal locus 'manage their activities in a thoughtful manner, they are more likely to succeed in an online class' (Wang and Newlin, 2002, p.3). Martinez (2003) remarked that persons with a strong internal locus of control believe that they can make a difference in the outcome of a situation. In effect, drop outs from online courses scored higher in external locus of control (Martinez, 2003).

Agency is a term which has its origins in sociology. Biesta and Tedder (2006) reviewed the work on agency of several philosophers and authors (including Mead, 1932; Emirbayer and Mische, 1998; Dewey, 1922; Levine, 2005; Bauman, 2000; Bourdieu, 1990; Giddens, 1991, Arendt, 1977). Biesta and Tedder (2006, p.27) described agency as an 'ability to exert control over and give direction to the course of one's life'.

Self-directedness is a concept commonly used in education to describe active learners who have the capacity to engage in independent learning activities (Knowles, 1975; Brookfield, 1985; Brockett and Hiemstra (1991); Taylor, 1995; Gibbons, 2002; Chou and Chen, 2008). Self-directed learners also interact with peers so as to exchange valuable information (Brown and Duguid, 1991; Russell, 1999, Brookfield, 1985, Merriam and Caffarella, 1991, Candy 1991).

Self-directed learners cause a shift in learning responsibility from the teacher to the student (Gibbons, 2002). They have been also described as being able to develop (1) self-regulatory strategies which help in the construction of meanings, retention of information and monitoring to control their progress

(Miltiadou and Savenye, 2003; Zimmerman, 1994; Abrahamson, 1998), and (2) resource management strategies to manage their time and study environments, to monitor effort, learn from resources and peers and to seek help and support (Pintrich and DeGroot, 1990).

Consistent with the above, Guglielmino and Guglielmino (2003) portrayed the self-directed learner as having:

- a good understanding of ways of managing learning;
- a strong desire to learn resulting in a curiosity which makes learning a pleasurable experience, a self-confidence which gives competence and learning effectiveness, a willingness to ask questions, seek clarifications and advice; valuing of the learning which has been achieved and an independence to analyse, plan, execute and assess learning;
- reading, writing and time management skills;
- abilities to set a learning goal, to develop a learning plan, to identify resources for learning, implement and evaluate the learning, to find alternatives and to solve problems; to reflect on their actions and performance, analysing their learning and being constantly aware of changes in the environment and possible implications;
- a persistence and not be deterred by obstacles in reaching the goal.

Chou and Chen (2008) grouped the self-directed learner characteristics in four categories: independence, self-management, desire for learning and problem-solving.

The next section discusses the affordances of the online medium.

2.2.5.2 A medium supporting the development of skills

Smith and MacGregor (1992) noted that collaborative practices provide learners with skills to carry out dialogue, for deliberation and for consensus building which are important for learning in the class and also for outside world communities. The following studies have shown that the online medium supports the development of skills and learner characteristics which are required for online collaborative learning.

Taylor, Pillay and Clarke (2004) explored the students' adaptations to new learning environments which involved blending learning and found that these environments initiated new opportunities inviting students to change as learners. In blended learning courses, the students appeared to be responding in ways where they became independent and less reliant on the teacher. They also seemed to become aware of and to value resources which assisted them in gaining their independence.

Oliver and McCloughlin (2001) based their research analysis on Bennett, Dunne and Carre's (1999) framework of generic skills and confirmed that online collaborative learners became capable of managing themselves, other learners, the task and the information which they located. Liu, Lavelle and Andris (2002) also found that online learning can be an effective method to train students to become more self-responsible and to develop an internal locus of control.

The literature reviewed in Part II provided an understanding of the online learners' characteristics and how online learning may provide opportunities for students to change as learners. Part III is a review of the literature on learning dispositions and learning identities.

Part III

2.3 Learning dispositions and identities

Part III provides an understanding of the impact of online collaborative learning on the learners, in terms of development of learning dispositions and transformation of learning identities.

2.3.1 Learning Dispositions

Section 2.2.5.1 (ii) indicated that the learning dispositions for the formation of an online learning community are essential online learner characteristics (Bernard et al, 2004; Palloff and Pratt, 2003). This section discusses further the literature concerning learning dispositions.

The concept of dispositions can be traced to Aristotle where he referred to an ethical virtue or hexis which is a condition (disposition) induced by habits and which produces particular feelings (Kraut, 2005). Bourdieu (1930-2002) used the term habitus to describe an embodied system of dispositions (Scahill, 1993; Maton, 2008). Habitus is structured by an individual's past, and shapes the individual's present and future practices; it is a 'structured and structuring structure' which results in perceptions, feelings and actions 'in accordance with its own structure' (Maton, 2008, p.51).

Katz (1988) visualised dispositions as habits of the mind and tendencies to respond to situations in a certain way. Perkins, Jay and Tishman (1993), consider dispositions as skills, inclinations and sensitivities to occasions. However, other researchers argued that students may have a particular skill, but not the readiness and the willingness to use it (Katz and Raths, 1985; Katz, 1993; Claxton and Carr, 2002). Claxton and Carr (2002) considered cognitive skills, strategies and abilities as capabilities. According to them, Carr (1995) and Smith (2009), a disposition is a tendency to edit, select, adapt and respond to the environment in a recurrent characteristic kind of way. Claxton and Carr (2002) summed up capabilities and dispositions as learning power.

2.3.1.1 Identifying key learning dispositions

Katz (1988) argued that it is useless for students to be taught skills, if the disposition to use such skills has been damaged or is not present. For example, students are taught how to read but the intense drill and practice makes students dislike reading. Katz (1988) was eager to include the key learning dispositions as outcomes in educational practice. She maintained that desirable dispositions in students should be strengthened, whereas non-desirable dispositions should be weakened. Claxton and Carr (2002) also convinced of the importance of learning dispositions proposed the inclusion of dispositions as educational goals in addition to knowledge, skills and feelings in educational curricula.

In a drive to identify key learning dispositions several authors provided their own 'little lists' (Coffield, 2002). Bronfenbrenner (1979) listed: to think, to persist in tasks, to give opinions, contribute ideas, and to work collaboratively.

Goleman (1996) proposed: confidence, curiosity, intentionality, self-control, relatedness, communication and co-operation. Claxton (1999) listed: mindfulness, selectivity, experimentation, reflection, opportunism and conviviality. Carr (2001) suggested five main domains of learning dispositions: taking an interest, being involved, resilience, communicating with others and taking responsibility. Raths (2001) put forward three learning dispositions which are to value learning, colleagueism and advocacy.

It can be seen that there is considerable overlap in the meanings of some of the proposed dispositions. There is also a diversity of terms covering self-concepts such as confidence and self-control, and interactive aspects such as reciprocity and collaboration. Claxton and Carr (2002) researching early childhood settings, focused on the learning disposition domains of resilience, playfulness and reciprocity. Coffield (2002) proposed critical intelligence as an additional fourth domain. Katz (2002) criticized Claxton and Carr's (2002) little list as she argued that the three selected terms might be misleading and quoted examples where resilience, reciprocity and playfulness could be negative learning dispositions.

Duncan, Jones and Carr (2008), explored the learning disposition domains of resilience, reciprocity and imagination. According to Claxton (2006), the 4Rs representing resilience, reciprocity, reflection and resourcefulness, expand the students' capacities for learning. These are used as criteria to build learning power in schools in the UK, e.g., Waycroft Academy, Presdales School and several other schools.

Sadler (2002) argued that Claxton and Carr (2002) may have overestimated the importance of dispositions in learning events and maintained that learning dispositions are not enduring and depend on the context. Sadler (2002) added that the object of the learning, the source and nature of the drive to learn and the anticipated results of learning, make an individual disposed to learn. He concluded that these factors should be the key determinants for learning.

2.3.1.2 Developing and cultivating dispositions

Claxton (2002) and Dweck (2006) maintained that the emphasis in teaching should be made at developing and cultivating positive learning dispositions in students in addition to teaching subject content (Claxton and Carr, 2004). The manifestations of dispositions is closely linked to student past experiences, learning opportunities, and affordances and constraints in the setting (Claxton and Carr, 2002). Learning dispositions are developed by observing people who themselves model the dispositions (Carr, 1995; Duncan, Jones and Carr, 2008). They are contagious (Vygotsky cited in Claxton, 2007, p.118) and are open to further development and change (Claxton and Carr, 2002). Claxton and Carr (2002) pointed out that this has implications for teaching and learning: teachers with positive learning dispositions such as being academically curious, imaginative, empathetic, and innovative have the potential to transmit these dispositions to their students. Students, in turn need to be in learning environments which allow them to practice learning dispositions and where they can acknowledge and appreciate the learning dispositions (Claxton and Carr, 2002). Wakefield (1993) noted that students can develop dispositions when they are influenced by events such as teacher advice, peer actions, class discussions and observations. Smith (2009) conducted a case study, where she followed the trajectory of the learning disposition, reciprocity, of a four year old child. Smith (2009) showed that, as claimed by Carr (2001) and Duncan, Jones and Carr (2008), learning dispositions are 'participation repertoires', which are shaped by settings and social interactions and in turn they shape the latter. Smith (2009) suggested that learning dispositions provide opportunities for a move from a position of peripherality and non-participation to agency and authority.

2.3.1.3 The occurrence of learning dispositions.

Beliefs result in dispositions (Katz and Raths, 1985; Dweck, 2006) and dispositions are indicated by actions (Dweck, 2006). Claxton and Carr (2002) described a disposition, in terms of its robustness, breadth and richness. A disposition becomes robust if it persists when the conditions which had supported it would have disappeared. The breadth of a

disposition is illustrated by the extent of different contexts in which the developed disposition is applied. A disposition increases its richness, when learners become engaged in strategies which strengthen the disposition.

A disposition may form a dispositional domain and may consist of sub-dispositions. Each disposition is identified by a set of indicators. For instance, the disposition to be questioning may belong to a dispositional domain such as to be communicative or to be resourceful. The disposition itself incorporates other sub-dispositions, e.g., a disposition to be self-confident, which is indicated by the will to ask and discuss, a disposition of having a sense of occasion, which is indicated by the fact of choosing when to ask, and a disposition of entitlement, which is indicated by believing in a right to be curious and to ask (Claxton, 2006).

Deaken, Crick and Yu (2008) argued that learning dispositions reflect the learning identity of a learner, and at the same time they can also enhance learning and result in further learning.

> Learning dispositions are personal and autogenic and on the one hand, reflect 'backwards' to the identity, personhood and desire of the learner, and on the other hand, can be skilfully mobilised to scaffold 'forwards' towards the acquisition of the knowledge, skills, and understanding necessary for individuals to develop into competent learners.
>
> Deaken, Crick and Yu, 2008, p 389

In this research, online collaborative learning demanded the development of learning dispositions, which in turn, resulted in changes in the students as learners. These changes are explored further in the next section.

2.3.2 New learning identities

In the early stages of the research, it became imperative to explore the literature on learning identity so as to be able to understand the changes in the students as learners and the impact of online learning on their learning identities (Research questions 2.1 and 2.2).

2.3.2.1 The concept of identity

Although originally, identity formed part of psychological vocabularies (Sfard and Prusak, 2005 p 14), it has been adopted by several disciplines concerned with society and human behaviour. This is indicated by the numerous aspects and contexts of identity found in the literature, some of which concern this research and will be discussed in this section.

Stets and Harrod (2007) define identity as a set of meanings attached to the self. Back and Pratt (2007) argued that despite the fact that several definitions of identity focus on the self, an identity is constructed in association with other individuals. Identity is often visualised as a communicative process or as a narration about a person (Sfard and Prusak, 2005). A person can have multiple identities, as stories told by different people about the same person may differ. Sfard and Prusak (2005) represent a narration as a triple ${}_{B}A_{C,}$ where A is the identified person, B is the author and C is the recipient. The author and the recipient can be the person to be identified, or different persons giving possibilities of ${}_{A}A_{C}$, ${}_{B}A_{A}$, ${}_{B}A_{C}$ and ${}_{A}A_{A}$.

Sfard and Prusak (2005, p.17) consider the ${}_{A}A_{A}$ identity as the most 'endorsable, reifying and significant' form. Shotter (1993) and Holland et al (1998), refer to identity as the narrations of people telling others who they are and in doing so, they are telling themselves who they are and try to act in that way. In the process, people create different social relationships, wherein they also construct a sense of their identity (Shotter, 1993; Weinreich and Saunderson, 2003). Yates (2001) and Gustafson, Hodgson and Tickner (2004) argue that online identities are therefore constructed when people participate in online discussions. This implies that the construction of individual identities and social relationships can be examined by analyzing online postings (Gustafson, Hodgson and Tickner, 2004).

Identity has been described as multifaceted by Moingeon and Soenen (2002) who researched the identity of organizations. This concept may be applied to the context of an individual's identity. Moingeon and Soenen (2002) portrayed a dynamic system of five identities, which influenced each other: a *projected* identity influences the *attributed* identity and may be an expression of the

professed identity; it may be influenced by the *experienced* identity and the *manifested* identity. Bilgrami (2006) writing about political identities, distinguished between subjective identity which is what one conceives oneself to be, and objective identity, which is how one might be viewed independently of how one sees oneself. Furthermore, persons' views of themselves are influenced by what 'significant others' say about them; they see themselves from the perspective of others and a shared meaning of the self develops (Mead 1934, cited in Stets and Harrod, 2004).

The next section discusses the relation between learning and identity.

2.3.2.2 Learning and identity

The ontological approach to learning advocates that learning changes both what the learner knows and also who the learner is (Packer, 2001). Vygotsky (cited in Levyck, 2008, p.126) stated that if nothing changes, nothing has been learnt. Wenger (1998) describes learning as a transformation of identity:

> Because learning transforms who we are and what we can do, it is an experience of identity. It is not just an accumulation of skills and information, but a process of becoming – to become a certain person…
>
> Wenger, 1998, p. 215.

Learning is seen as an experience of identity, which is ongoing and constantly being renegotiated (Wenger, 1998; Holland et al, 1998; Sfard and Prusak, 2005; Massey, 2005). Sfard and Prusak (2005) argued that this dynamic nature of identity is the basis for learning and portrayed learning as closing the gap between the actual identity and the designated identity. The former comprises stories about the actual state of affairs and the designated identity is composed of narratives which are expected to be the case in the future. The designated identity and Wenger's (1998) similar notion of imagination extend the existing engagement process and influences a person's thoughts and guides actions. Holland et al (1998, p 5) emphasized that identity is an important base 'from which people create new activities, new worlds and new ways of being'. It is a trajectory incorporating a past and a future (Wenger, 1998) because the way a person senses himself in the present, expresses continuity between his

understanding of the past and his understanding of how he hopes to be in the future (Weinreich 2003).

The next section focuses on the analysis of one aspect of an identity - the learner's learning identity.

2.3.2.3 A model of a student learning identity

Chickering and Reisser (1993) stated that a learning identity of a college student is shaped by emotional, social, physical and intellectual elements, and they illustrated this in a model showing the development of the learning identity along the following seven vectors:

1. Developing competence
2. Managing emotions
3. Moving through autonomy toward interdependence
4. Developing mature interpersonal relationships
5. Establishing identity – a strong sense of the self
6. Developing purpose, and
7. Developing integrity

The seven vectors (V) explain the ongoing changes associated with learning in students. Some of the vectors such as developing competence (V1), managing emotions (V2), and developing a purpose (V6) directly affect the self, whereas other vectors, e.g., such as developing mature interpersonal skills (V4) and developing integrity (V7) affect the student identity in relation to a community. Moving though autonomy toward interdependence (V3) encompasses the student developing both emotional and instrumental independence. The former refers to development of self-confidence where the student does not need to rely on reassurances, affection and approval. The latter refers to the student becoming a self-directed learner and at the same time respecting others and sharing with others (Chickering and Reisser, 1993).

The authors stressed that establishing identity (V5) encompasses the first four vectors and refers to the student developing a strong sense of the self and being

able to define the self with respect to religious or cultural tradition, and within a social and historical context. In addition to this, as the student gains a sense of how they are seen and evaluated by others, this vector 'leads to clarity and stability and a feeling of warmth for this core self as capable, familiar and worthwhile' (Chickering and Reisser, 1993).

The developing competence vector (V1) covers both the acquisition of intellectual, physical and interpersonal skills and also the confidence which is essential for the development of a strong sense of competence (Chickering and Reisser, 1993). Developing purpose (V6) requires the learner to be intentional and able to assess interests and options, to clarify goals and to make plans. It also refers to the development of determination and resilience. This vector aligns with Sfard and Prusak's (2005) designated identity and the notion of imagination in Wenger's work (1998), which guide and direct learning (Section 2.3.2.2).

This model confirms the complexity of a learning identity and its dynamic nature. The next section looks at research concerning different aspects of the learning identity.

2.3.2.4 Different aspects of identities

Solomon (2007) investigated the competence of twelve first year university mathematics students with respect to understanding and applying principles. She found that only one student was a novice with an identity of legitimate peripheral participation. The other students followed rules in mathematics without understanding them and took on an identity of non-participation and an identity of exclusion. Laird (2005) discussed three aspects of a learning identity: academic self-confidence, critical thinking disposition and social agency. Stets and Harrod (2004) investigated the verification of three identities – working, academic and friendly identities in a randomly selected group of adults. Stets and Harrods (2004) viewed academic identity, as a task-oriented identity with the performances of participants revealing meanings of agency, power and competence. They defined competence as the aptitude, talent and ability to achieve one's goals; agency is indicated when an individual makes

conscious choices in the construction of contexts and power refers to the authority and enablement which a person gains and exercises.

This task-oriented perspective of academic identity with its recognition of the power relationships involved in learning resonates with my blended learning research context, and I therefore adopted this as the basis for my discussions of academic learning identity in subsequent chapters of this thesis. Holland et al (1998) believed that identities develop in and through social practice and visualised community systems as figured worlds. In this research, I also used the concept of figured worlds to frame the changes in identity of online learners. The concept of figured worlds is explained in the next section.

2.3.2.5 Figured worlds

According to Holland et al (1998), figured worlds are places where persons with different identities build communities by constructing joint meanings and by sharing activities. The agents in a figured world engage themselves in a range of meaningful acts which are influenced by a specific set of positive and negative forces. Similar to Wenger's (1998) notion of a 'renegotiated' identity, Holland et al (1998) described new identities of agents as constantly being reformed in relation to everyday activities.

Boaler and Greeno (2000) used the concept of figured worlds to compare mathematics classrooms in six different colleges. One figured world was staged within an ecology of didactic teaching in the face-to-face classroom. The students presented this world of 'received knowing' (Belenky et al, 1997) as 'structured, individualized and ritualized'. Another figured world was based on an ecology of discussion-based teaching in the face-to-face classroom. This world of 'connected knowing' (Belenky et al, 1997) was shown to be 'relational, communicative and connected'. The authors interviewed 48 students and interpreted the results in terms of the students' positioning and authoring.

In my research, the students were familiar with the acts and forces in the figured world of didactic learning. Some students eventually became agents in a figured world of online discussion-based learning. They engaged themselves

in a range of new practices, and this changed their individual positions in the community (Wortham, 2004) rendering new opportunities for the application of thought and the development of agency (Holland et al, 1998). The dynamic nature of the students' learning identity became evident as changes in the academic and positional identities. Positional identity is a key construct in figured worlds and this is discussed in the next section.

2.3.2.6 Positional identity

Learning is 'fundamentally experiential and fundamentally social' (Wenger, 1998, p.227). Deakin Crick and Wilson (2005) wrote that the social environment and the quality of learning relationships affect the learner's development. As learners construct a sense of who they are and of their roles (Biott and Easen, 1994), they establish a positional identity (Holland et al, 1998, Burr, 2003, Kasworm, 2009). Holland et al (1998) defined positional identity as:

> a person's apprehension of her social position in a lived world; that is depending on the others present, of her greater or lesser access to spaces, activities, genres, and through those genres, authoritive voices, or any voice at all.
>
> Holland et al, 1998, p.127-128

Positional identities are concerned with every day interactions concerning, relations of power, entitlements and social affiliations. Allen (2004) notes, that in a classroom, positional identities are formed in response to how the students participate in classroom activities, and, how that participation is viewed by themselves and others. The identities of individuals in a community are continuously reinvented in interaction with others in the community (Wenger, 1998; Nasir and Saxe, 2003; Back and Pratt, 2007).

As students reflect on their own and each others' strengths and weaknesses (Biott and Easen, 1994), they perceive their state in relation to the state of others (Solomon, 2007, Kasworm 2009) and hence also develop a relational identity. According to Holland et al, relational identities involve:

> how one identifies one's position relative to others, mediated through the way one feels comfortable or constrained, for example,

> to speak to another, to command another, to enter the space of another.
>
> (Holland et al, 1998 p.127-128)

In networked learning, relational identity may be manifested in the way, the students present and express themselves in dialogue with others. According to Gustafson, Hodgson and Tickner (2004), the relational identity affects group dynamics especially the participants' perception of 'intimacy and immediacy'. These authors discussed how online participants acquire a sense of their identity and the identity of others from the way they express themselves in writing. Furthermore, they argued that the types of discussions that ensue depend on what kinds of identities come together. In the Socratic dialogue, the participants take on equal identities with equal roles, whereas in the Magistral dialogue, one person takes the authoritive identity, dominating other participants.

This research, explores how learning identities in terms of academic and positional identities of the online participant students changed as students familiar with one figured world became agents in a new figured world which necessitated new acts and was shaped by new positive and negative forces.

2.4 Conclusion

This literature review was divided in three parts. Part 1 gave a general support to explore all the research questions. It provided an understanding of the learning approaches aligned with blended learning (Section 2.1.1.2) and collaborative learning (Section 2.1.2.1; 2.1.2.3). It discussed studies which showed the effectiveness of blended learning (Section 2.1.1.3). The literature suggests that the pedagogies employed in the online component of blended learning may be an opportunity to change the traditional learning approaches in the face-to-face class (Section 2.1.1.2). The theoretical approaches of collaborative learning gave an understanding of how collaborative learning leads to the personal construction of knowledge in the individual and in the individuals as a group. A key issue which emerged is that learning is a social activity involving both cognitive and affective processes (Section 2.1.2.3.ii).

The Community of Inquiry model (Section 2.1.3) highlighting the importance of social, cognitive and teaching presences was presented as a model for online collaborative learning with potential of extending the model to the face-to-face class in the blended learning context.

Part II focussed on the learners' response to online learning and was useful in the analysis of the students' experiences, i.e., in the exploration of the online behaviour patterns and the factors which affected online learning behaviours. Various researchers proposed models to explain student persistence or attrition in online courses. These models helped me design a framework within which I discussed the factors which affected online participation. Studies showed that online learners show extreme variation in online behaviours (Section 2.2.4.4). The literature review revealed that although students may face problems due to prior experiences and perspectives of learning (Section 2.2.4.1), due to developed emotional states (Section 2.2.4.2) or due to lack of collaboration skills (Section 2.2.4.3), there is evidence that students learn to adapt and acquire the essential online collaborative learning skills when they experience the innovative learning environments (Section 2.2.5.2).

Part III provided an understanding of learning dispositions (Section 2.3.1) and the concept of learning identities (Section 2.3.2). This was essential for the identification of learning dispositions in my study and to discuss the transformation of learning identities in terms of academic and positional identities. This section primarily addressed the second research question.

The key concepts and models in the literature review, which were adapted and used in this study, and the corresponding research questions, are listed in Table 2.3. These models and concepts were used to frame the analysis and to discuss the results in this research.

Table 2.3. The models and concepts adapted from the literature

	Model/concepts	Adaptation	Research Question
1	Garland (1993)	A framework for the analysis and discussion of the factors affecting online participation (Section 5.2).	1.2
2	Claxton and Carr (2002)	Learning dispositions: to discuss the enablers for online participation (Section 5.5.4).	1.2 2.1
3	Holland et al (1998)	Figured worlds: to discuss the transformation of learning identities (Section 5.9).	2.2
4	Stets and Harrod (2004)	Academic identity in terms of components of competence, agency and power (Section 5.10.1).	2.2
5	Holland et al (1998)	Positional identity (Section 5.10.2) and relational identity (Section 5.10.2.3)	2.2

The purpose of the research was to explore and understand the learners' online behaviours and to interpret the meaning of their experiences. The literature was scarce regarding studies on the online behaviours of college students (16 – 18 year olds) in a blended learning context. This research aims to make contributions to knowledge in this area by investigating the factors which affected online participation and then exploring the changes which were happening in the students as learners. I applied my new understandings which were reached through the review of the literature, to comprehend the students' behaviours and experiences.

The next chapter discusses the methodological foundation for this research and outlines the methodology in this study of student experiences in a blended learning class.

Chapter 3: The Research Methodology

3.0 Introduction

This research set out to explore the online learning experiences of a class of thirty-seven students, who were given the opportunity to follow a blended learning course in A-level chemistry.

Chapter 3 describes the methodological foundation for the investigation of the students' online learning behaviours and experiences. In Section 3.1, I discuss my philosophical assumptions. The research questions are presented in Section 3.2. Sections 3.3 and 3.4 look at the role of the researcher as a practitioner researcher and as a self-instrument in the research respectively. Sections 3.5 and 3.6 discuss case-study research and the research design in this study. Issues regarding ethical considerations, gaining access to the participants in the study, and establishing rapport are discussed in Sections 3.7, and 3.8. An evaluation of the study is given in Section 3.9. Section 3.10 presents an overview of the study. Sections 3.11 and 3.12 discuss the data generating methods and their integration within the online course. The treatment of data is discussed in Sections 3.13 and Section 3.14. Section 3.15 concludes this chapter.

3.1 My underlying philosophical assumptions

In this section, I discuss my philosophical assumptions of ontology, epistemology, axiology and methodology (Creswell, 2007), which influenced this research inquiry, i.e., the formulation of the research questions and the research methods (Guba and Lincoln, 1994; Creswell, 1998, 2007; Cohen, Manion and Morrison, 2000; Krathwohl, 1997; Morrow, 2007).

My ontological orientation: I believe in multiple realities and hold that knowledge is constructed in human minds through personal experiences. In this enquiry of online behaviours, I view reality as different worlds, each as being experienced and perceived by individual students. This view of reality is consistent with a constructivist ontological approach. I constructed a picture of the participative and interactive worlds of these students and I am aware that

my account of interpretations of their worlds is just one interpretation of 'many possible ways of rendering social reality' (Bryman, 2004 p 498).

My epistemological orientation: I conducted this research with an interpretivistic epistemological stance. I ventured to interpret and understand the experiences and the social worlds of individual students. My intention was to provide an interpretation of social reality to produce a rich picture of individuals and the ongoing interactions amongst them and their surroundings. This is a double hermeneutic process as I constructed reality through my interpretations of the learners' interpretations.

My axiological orientation: Researchers bring values (Creswell, 1998, 2007), prior experiences, assumptions and preconceptions (McCracken, 1988; Smith, Flowers and Larkin, 2009) to a study and are also affected by what they hear and observe (Miles and Huberman, 1994; Smith, Flowers and Larkin, 2009). Although as a researcher, I constructed my own understanding of social phenomena, I was conscious not to allow my values and biases to influence the students' responses to my inquiry.

My methodological orientation: The methodological or procedural stance undertaken in this research is representative of an interpretative inquiry with 'an emerging design' (Creswell. 1998 pp 78). As this is a qualitative research inquiry with an inductive approach between theory and research, the explanations in this study, grew out of the data. Such a methodology is flexible and affords a modification of the research questions and data collection strategy (Robson, 2002). Refinement of the research questions and revision of the research methods were an ongoing process (Section 3.3), as new data emerged (Creswell, 2007; Maxwell, 2008).

3.2 The Research questions

Two overarching research questions directed this inquiry. The first research question (RQ 1) concerned the students' experiences and was addressed through an exploration of two sub-questions (1.1, 1.2).

RQ 1: What were the experiences of students following an online collaborative program in a blended learning context?

1.1 What were the online behaviour patterns of the learners following a blended course?

1.2 What factors influenced online behaviours in a blended learning context?

As the data in this study emerged, and further literature was reviewed (Section 2.3) a second overarching research question (RQ 2) was formulated. This was explored through two research sub-questions 2.1 and 2.2.

RQ 2: What was the impact of these online experiences on the learners?

2.1 How did online participation change the students as learners?

2.2 What was the impact of online learning on the learning identity of the learners in the online and the face-to-face class?

The above research questions drove the enquiry. They set the immediate agenda for the research, established how data was to be generated, limited the boundary of time and space, facilitated the drawing up of ethical guidelines and suggested how analysis starts (Bassey, 2002).

3.3 The researcher as a practitioner researcher

The 'practitioner as researcher' concept can be traced to the work of Stenhouse (1975) and Kemmis and McTaggart (1988), who supported teachers to take an active role in teacher research. Schon (1987) described practitioner research as a reflective activity carried out by practitioners, in, on and about their practice. Goodfellow (2005, p.48) defines practitioner research as 'research undertaken by practicing teachers who seek to improve practice through purposeful and critical examination of, and reflection on their work'.

Practitioner research enables practitioners to create and extend professional knowledge, clarify and improve practice and influence policies in an informed way (McTaggart, 1988; Macpherson et al, 2004; McWilliam, 2004). The practitioners develop a greater appreciation of their professional practice and take up opportunities to review and challenge the assumptions and values that underpin such practices (Goodfellow, 2005). Elliott (1991, p.45) viewed such research as a resolution of the theory-practice debate, where teachers tend to disregard theory, which according to them is 'produced by a group of outsiders

who claim to be experts at generating valid knowledge about educational practices'. Practitioner research may lead to immediate professional change (Dadds, 2004), as the perceptions and actions of the practitioner may result in immediate changes to some aspect of the teaching and learning.

The practitioner as the researcher has a considerable amount of prior knowledge of the circumstances of the study (Dadds, 2004) which is not available to outsider researchers (Goodfellow, 2005; Paris et al, 2007) and can help to design studies which are appropriate and relevant to the needs of participants and their contexts (ProDait, 2006).

According to Dadds (2004) a practitioner researcher has the following attributes:

- a questioning mind with a readiness to explore and gain new understanding;
- a reflective disposition to make sense of the complex information that is gathered;
- a sense of conviction and passion about the value of the work reinforced with a sense of care and responsibility which lead to a drive to improve practice;
- existing insider knowledge of the researched situation which stands as a reference to the newly gained understanding.

As a practitioner I designed, implemented and conducted a blended learning programme which included online collaborative learning to provide a socio-constructive approach to learning to my students. As a researcher, I pursued my curiosity, designed and implemented a research study to explore the students' response to the innovative approach. The new understanding extended my professional knowledge, put this knowledge to direct use and improved my practice. I also intend to disseminate my new understandings through publications of research papers, participation in international conferences, teaching student-teachers and through discussions with colleagues and other teachers. Thus practitioner research, although localised within a classroom, may, as in my case, be shared across the profession, and may 'work its way

into the larger fabric' (Dadds, 2004, p.4), with the possibility to influence general policies in an informed way.

3.4 The researcher as self-as-instrument

Dey (1993) believed it necessary for researchers to consciously separate from their personal experience and prior knowledge and not to allow these to interfere with the collection or interpretation of data. In contrast, Denzin and Lincoln (2000, p.19) stressed that, 'the age of value free inquiry' is over and that researchers seek to develop situational and trans-situational involvement, justified by ethical issues. Reason (1988, p.12) refers to critical subjectivity, where the researchers use an awareness whereby primary experiences are neither suppressed nor dominating in the research, but they are raised 'to consciousness' and used 'as part of the inquiry process'.

McCracken (1988, p.19) described the researcher as 'self-as-instrument', with an ability to understand the respondents' claims either through a matching process or through imaginative reconstruction. In the former, researchers find a match in their own experiences which helps them understand the circumstance. When this is not possible, the researchers reconstruct a version of the respondent's view of the world. According to McCracken (1988), the latter, results in the real achievements of qualitative methodology and secures the researchers' gain of an insider's perspective.

According to Diaz Andrade (2009), interpretive research views reality as socially constructed and the researcher is instrumental for this reality to be revealed. Thus, it is a necessity that researchers use their past experience and knowledge to provide an insight in the data collection and analysis phases (Robson, 2002; Maxwell, 2008; Diaz-Andrade, 2009) and to furnish the cognitive capacity to interact with the data (McCracken, 1988; Dadds, 2004).

3.5 A case-study design

Freebody (2003, p.82) remarked that the distinctive feature of a case-study methodology is its focus on 'attempting to document the story of a naturalistic-experiment-in-action'. Bassey (2002 p.110) emphasised that 'case-study

research entails being where the action is, taking testimony from and observing the actors first hand'. This study of a class of thirty-seven students is a case-study focusing on 'one particular instance of educational experience and attempts to gain theoretical and professional insights from a full documentation' of this instance (Freebody, 2003, p.81). Stake (1995) considered the emphasis on the uniqueness of each case-study and the educator's subjective experience of the case as benefits of case-study research. The major conceptual responsibilities of the researcher in case-study research as described by Stake (2000), Creswell, (2007), Freebody (2003), and Yin (2003) are:

(1) the bounding of the case in space and time, and conducted in a natural setting;

(2) formulating the research questions in terms of issues or phenomena;

(3) planning data gathering;

(4) collecting and storing extensive and multiple sources of data;

(5) seeking patterns of data;

(6) triangulating the data, comparing and contrasting interpretations;

(7) interpreting the data;

(8) developing assertion about the case.

A multi-method research approach ensures an in-depth understanding of a phenomenon (Denzin and Lincoln, 2000; Reid, Flowers and Larkin, 2005, Cohen, Manion and Morrison, 2000, Bush, 2002, Flick, 2009). The strategy of combining observations, perspectives, empirical materials and multiple methodological practices in a single study adds rigor, breadth, complexity, richness, and depth to any inquiry (Flick, 2009) and provides various methods of triangulation of results, which compensate for the uniqueness and subjectivity issues (Stake, 1995). Nisbet and Watt (1984) suggest that a case-study should start with a wide field of focus which thereafter narrows down.

This case-study entailed a multi-method (Table 3.1) research inquiry with a zooming in approach. Although the research in this case-study was idiographic

in focus, the data was analysed at a student individual level, and at a group level (Section 3.14), thus presenting multiple units of analysis (Anderson and Burns, 1989; Freebody, 2003).

3.6 Selecting the research methods

An interpretive approach based on phenomenological, hermeneutical and idiographic research methods within a case-study research was considered to be the most appropriate method of research. After establishing the need for a qualitative methodological strategy, it was then required to select the research methods that were consistent with the assumptions and best fit the inquiry under study and as directed by the research questions. The overall details of the research design were developed through an exploratory study (Section 3.11.1). As data generated within the main study emerged and was analysed, it became evident that online learning was changing the way students were interacting with subject content and with each other in both the online and in the face-to-face environment. This led to the refinement of research sub-questions 2.1 and 2.2 and a modification in the research design.

The overall research design developed into a zooming in approach (Nisbet and Watt, 1984). This allowed me to gain an insight of online collaborative learning as experienced by all the students, and then, to eventually focus on a selected group of students. In order to address the research questions, appropriate data generation methods were needed to:

- obtain background information about the students' technology profiles;
- observe the online behaviour patterns;
- explore the factors which influenced online behaviours;
- understand and interpret the experiences of online collaborative learning of individual students;
- understand the impact of online learning on the students as learners;
- understand the impact of online learning on the students' learning identities in the online and face-to-face class.

Sufficient data needed to be generated to allow 'for exploration of significant features of the case', 'to create plausible interpretations of what is found' and 'to test for the trustworthiness of these interpretations' (Bassey, 2002, p109). The exploratory study experience (Section 3.11.1) indicated the data generation methods which could be (1) retained (2) refined or (3) discarded and replaced by other methods in the actual study. In the main research study, anonymous questionnaires, group unsolicited and focus group interviews were used to explore the general experience of the whole class, whereas, observations, online informal and face-to-face chat, online personal reflections, and individual interviews were the means to generate data about individual particular students. These data generating methods are discussed in Section 3.12.

The next two sections discuss the ethical issues which were considered in the study, and the strategies which were involved in gaining access and building a good rapport with students.

3.7 Ethical considerations

Permission for this research was sought from the Board of Ethics at the University of Nottingham. A letter asking permission to carry out the research at the Junior College was sent to the principal of the college (Appendix I). Approval for the study was granted by both entities. The students were briefed about the innovative mode of study and the research. Letters of consent were given to the students, inviting them to participate in the research (Appendix II). Consent forms were not sent to the students' parents because all the students were over sixteen years of age (BERA, 2004) (Section 1.1.2).

In both the consent form and in class, the students were informed about the purpose of the research, the benefits that should accrue from blended learning and the research, and the extent of their participation in the research. They were also assured that:

- all generated data would remain confidential;

- real names of students would not be used in the report or presentation of the study;
- there were no known risks associated with participation in the study;
- participants would be allowed to read the transcripts of the interviews, if they wished to do so.

Tobin (2006) referring to the Belmont Report (1979) emphasised that the three general principles of respect, beneficence and justice should guide a research. In this study, an equal respect for and appreciation of every student was shown (Tobin, 2006, Griffiths 1998), irrespective of the extent of student participation in the online course or in the research. One ethical issue concerned the teacher-student power relationship. The students had to decide whether to accept to be a participant in a research conducted by their teacher. It could be that some students may not have wished to participate in the research, but may have felt obliged to do so. Students were both informally told in face-to-face class and also formally informed in the consent form that they had the right to voluntarily withdraw from the research study at any time, with no consequences regarding their participation in the online course or in the face-to-face class. All the students studying in this chemistry class signed the consent form and accepted to participate in the research.

Regarding beneficence, this research informed my practice and I as practitioner would benefit from this research. The benefits would also be for the teaching communities with whom I discuss and disseminate the research outcomes, and consequently, to students in the future. Several students in this research indirectly benefited from the context of the research as they adapted to the online learning environment, developed new skills and improved their learning.

3.8 Gaining Access and Rapport

This section discusses the actions which were taken to gain access to the students, and to build a good rapport with them. Walford (2001, p.31) stressing that ‘access is a process and not a once-only decision’, wrote that gaining access does not stop at obtaining consent from participants at the initial stages of a research but it has to be further negotiated at deeper levels, where the

researcher builds a relationship of trust with the participants. At this stage, students 'are prepared to be open and honest about their perceptions and beliefs' (Walford, 2001, p.34). Wellington (2000) pointed out, that at any time, the students may withdraw their permissions and trust.

To gain access to the students as participants and genuine collaborators in this research, it was necessary to build a good rapport with them. The students came to the College from different secondary schools. Most of them did not know each other and the relationship between the students and myself, was initially that of a new cohort and a new teacher. Developing a good rapport was essential for both the students' learning process and also for them to be genuine participants in the research.

Wellington (2000, p.64) remarked that, 'attitudes towards the researcher are likely to vary from suspicion, mistrust or cynicism, to awe, trust or friendship'. The following actions and processes facilitated the building of good rapport and trust:

- informing the students about the purpose of the research, and the benefits of its outcomes;
- explaining to students that the implementation of the online collaborative learning would facilitate their learning of chemistry;
- ensuring that the students understood the dichotomous nature of their involvement, i.e., as learners and as participants in the research;
- ensuring that the students understood what was expected of them in terms of participation in the research;
- carrying out frequent face-to-face chats about the ongoing learning and research process;
- setting up informal chats in the online medium which allowed socialisation and familiarisation processes, and where students could air their concerns.

It was imperative for students to develop an understanding of my genuine teaching efforts in both the online and the face-to-face class and to believe that

I was interested in their learning and that their learning was my priority. Frequent informal chats with the students in the face-to-face class and in the VLE, especially in the first weeks of the blended course gave me the opportunity to become aware, as early as possible of any sensitive or controversial issues which could affect negatively their online participation; where possible, appropriate and prompt action was taken over this. One issue concerned the reluctance of some students to work in groups (Section 5.5.1.2).

3.9 Evaluation of the study

Although the choice of research methods is influenced by the philosophical assumptions of the researcher, and the context of the research, researchers should take into account quality criteria (Bush, 2002). There is some reluctance to apply concepts of validity and reliability to interpretive research, because the very nature of the research rejects the existence of absolute reality (Easterby-Smith, Thorpe and Lowe, 1994; Scott and Usher, 1999).

Validity in qualitative research does not carry the same connotation as in quantitative research (Creswell, 2009). Internal validity is a measure of whether 'the effects observed as a result of an intervention have actually been caused by that intervention and not by some other impulsion' (Scott and Usher, 1999, p.149). External validity refers to the extent that findings may be usefully generalised to the wider population or to similar settings (Denzin and Lincoln, 2000). These terms, used in quantitative research have been replaced by alternative concepts which are more appropriate to the social world (Lincoln and Guba, 1985; Scott and Usher, 1999; Bush 2002; Creswell 2007; Creswell, 2009). Lincoln and Guba (1985) used the concept of trustworthiness with the terms credibility, transferability, dependability and conformability of a research as a replacement for internal validity, external validity and reliability. Other criteria which could be used in qualitative validation have also been suggested by other researchers (see Creswell, 2007, p.203).

Lincoln and Guba (1985) replaced internal validity by credibility. According to these authors, credibility of the research is established through respondent validation. Creswell (2007) considered validation in qualitative research to be

an effort to examine the precision of the findings and called for researchers to use accepted validation strategies such as prolonged engagement with participants and methodological triangulation of data. I carried out long term observation of the learners' online participation, and used a multi-method approach to explore the online experiences of the learners.

A relationship of trust and good rapport existed between the participants and myself as their teacher and as a researcher. This was important to obtain genuine and reliable data from respondents. Piaget (1929, cited in Wellington, 2000, p.144) remarked that respondents may give answers at random whereas others may use a romancing technique. In the former, the respondents are uninterested and give any answer to move on with the interview, whereas in the latter, the respondents invent an answer, which they do not actually believe in. In some cases respondents give the answers which, they think, would please the interviewer. Students, in this study, were reminded to be genuine in their responses in the research methods and to consider me as the researcher and not their teacher. This was also important to minimise any sense of teacher-students power relations. I had regular unsolicited informal chats with individual students who provided me with feedback regarding the pace and the level of difficulty of the online course. This feedback contributed to the smooth running of the online course, which was a necessity for the implementation of the research itself. The fact that students were given responsibilities in providing this ongoing feedback added to the trustworthiness of the research in that they could see that I took time to discuss issues with them, valued their views and had a genuine interest in improving their learning experience.

Transferability is the term which Lincoln and Guba (1985) used to replace external validity or generalisability. In qualitative interpretive research, the notion of having a sample as a good representation of the population is inapplicable. Scott and Usher (1999, p.151) explain that transferability is 'a looser notion than external validity, in that it places the burden of proof on the reader or user of the research'. The researcher uses rich and detailed descriptions of the subjects in the research and the setting, to produce a realistic scenario that the readers achieve the sensation of being there (Creswell, 2007). As stated above, my prolonged contact with the students and the multi-method

research approach to the investigation ensured a rich and thick description of the learners' world of online learning in a blended learning context. I constantly share my 'stories' from my research with student teachers, whom I teach at the University of Malta and I can see how these student teachers are able to engage with my work, relate it to their teaching practice experiences and feel encouraged to use VLEs in their teaching. It is hoped that other researchers or lecturers will also engage with and relate my research to their own work. Indeed, as Dadds (2004, p.3) remarks, 'the notion of relateability becomes more appropriate for practitioner research than the traditional research concept of generalisability'.

Reliability, an evaluation criterion used in quantitative research, relates to the probability that repeating a research procedure or method would produce identical or similar results (Yin, 2003). It is argued that in qualitative case-study research, a case is unique (Stake, 1995) and the notion of reliability (Bassey, 2002) does not apply. In addition, emergent research designs ensue in a qualitative inquiry and this rules out the idea of replicability (Scott and Usher, 1999). Lincoln and Guba (1985) replace reliability with the notions of dependability and confirmability. Dependability refers to the fact that the results will be subject to change and instability. It is an assessment of the quality of the integrated processes of data generation and data analysis. Confirmability relates to the establishing of the value of the data (Creswell, 2007). It is a measure of how well the inquiry's findings are supported by the data generated. Lincoln and Guba (1985, p.318) recommend the use of an auditor to confirm that the 'findings are grounded in the data' and 'that inferences based on the data are logical'. This calls for a transparency of the research methods and of the results that were obtained, whereby other researchers, auditors or interested persons may also rework through the data and the coding process to achieve a similar understanding of the situation.

This was addressed by documenting all procedures and giving details of all steps involved in the research (Yin, 2003; Silverman, 2005). I documented the research process in detail using a researcher journal, which I frequently read and copied into NVivo. I used a reliable digital recorder with high quality recording facilities. I listened to the recordings several times. Once the

recording was transferred and saved to the computer, the audio speed could be controlled and slowed down for easier transcription.

The research methods, generated data, interpretations of the data and conclusions in this research were thoroughly discussed with my doctoral supervisor and also with two other social science researchers at the University of Nottingham, who at certain stages during my research, were also involved in supervising my work. I also delivered a paper on my research and discussed the methodology and findings of this study at a doctoral colloquium session at a conference (EAITM, Malta, 2011).

3.10 An overview of the study

The main study was carried out in the academic year 2007-2008, and was preceded by a four-month exploratory study in the previous year 2006-2007 with a different cohort of A-level chemistry students. The research methods employed in the actual study were informed by the research questions, the outcomes of the exploratory study and by the model for analysis. In this model, the generated data was coded, reduced and categorised in themes. The use of a multi-method research inquiry afforded opportunities of triangulation methods across the data sets.

3.10.1 The exploratory study

The exploratory study was conducted with a class of thirty-two A-level chemistry college students from February 2007 to May 2007, with the aim to explore and test the use of particular research instruments. In this exploratory study a four-month online course complemented the face-to-face traditional classroom learning. Table 3.1 shows the data generation methods which were used in the exploratory study. All the data generation methods except for two methods were used in the main study.

Table 3.1. The data generation methods of the exploratory study

	Tool	Data
1	Researcher's reflective journal	Observation, reflections and development of ideas.
2	Learners' reflective journal	Logs of daily study time and study methods
3	Profile questionnaire (Q1)	Students familiarity with technology and students' perceptions of group work
4	Informal online forum	Students' impressions on use of VLE
5	Middle stages questionnaire (Q2)	Students' developed attitude towards online collaborative work
6	VLE activity observation and tracking	Students' access and engagement in the VLE
7	Final stages questionnaire (Q3)	Functioning of groups; and the students roles in small groups.
8	In- depth interviews -	In-depth individual interviews with seven selected students.

The two discarded methods were:

(1) The learner's reflective journal: Templates were given to each student to log the daily study time and modes of study. Two students responded to this research task. The other students may have found this research task time-consuming and inconvenient. This method of data generation was considered inappropriate and was not used in the main study.

(2) A final stages anonymous questionnaire (May, 2006): The students in the exploratory study responded well to this questionnaire which explored the role of each student with respect to the functioning of the groups in the online environment. However, anonymous questionnaires gave an all round general feel of the collaborative process as experienced by the whole class. Since research question 2.2 of the main study was refined to explore learning identities of individual students, this questionnaire was replaced with focus group meetings, and class individual interviews in the main study.

3.10.2 The main study

The main research study was divided into three phases (Phase 1: 10 weeks; Phase 2: 9 weeks; Phase 3: 12 weeks). The phases corresponded to the academic terms and were determined by the Christmas holidays between Phase 1 and Phase 2 and by the Easter holidays between Phase 2 and Phase 3.

An early stage analysis (Miles and Huberman, 1994; Krathwohl, 1997, Robson 2002) allowed reflection on the generated data at the end of Phase 1, the refinement of the research sub-questions 2.1 and 2.2 (Section 3.2) and the refinement of methods to generate further data. 'This makes analysis an ongoing lively enterprise that contributes to the emerging process of the fieldwork,' (Miles and Huberman, 1994, p.50).

The study initially looked at the large picture, exploring the experiences of thirty-seven students in the class, and finally focused on twelve individual learners (Nisbet and Watt, 1984). A general shift from anonymous data generation methods (questionnaires Q1, Q2 and Q3) in Phase 1 and Phase 2 to non-anonymous data collection methods, e.g., focus group meetings and interviews in Phase 3 occurred. This shift was justified by two ongoing processes:

(1) A good rapport developed between the students and myself, as practitioner-researcher, and therefore anonymity in research methods became pointless. Several students came forward with the information which I needed. This is an issue which emerged in this practitioner research. The developed good rapport and trust also gave credibility to the study (Section 3.9).

(2) The focus of the research eventually turned to learning identities. This necessitated a greater interest in individual students rather than gathering general and anonymous information. Questionnaires were certainly no longer appropriate in my research, because in questionnaires, answers tend to be brief and some students may not reflect when answering a questionnaire. I felt the need to listen to the students' voices and discuss at length and in-depth, the issues which affected their online participation.

The data generating methods which were used in the phases are discussed in greater detail in the following section.

3.11 The data generating methods

Table 3.2. Timeline: The data generation methods

Phase	Week	Research method
< 1	< 1	Questionnaire 1: profile questionnaire
1-3	1-32	Researcher's journal
	1-32	VLE tracking system
1	1-2	Informal online fora
	5	Student's reflective journal
	7	Questionnaire 2: early stages questionnaire
	8	Two ad-hoc group interviews
2	16	Questionnaire 3: Middle Stages questionnaire
3	23-24	Two focus group meetings
	28-34	23 Individual interviews; 12 in-depth interviews

Table 3.2 lists the data generating methods which were used in the three phases, i.e., in the 34 week period. The next section describes the data generating methods and their use in this research.

3.11.1 The researcher's journal

Entries in the researcher's journal, which was used in all three phases, included observations, reflections and developing ideas. It also included particular events and activities (Bogdan and Biklen, 1992) such as contents of informal or impromptu face-to-face discussions (Tobin, 2006) and an email sent by a student. The journal informed the topics for the unsolicited chats, which I frequently had with the participants at the College and facilitated the process of purposeful sampling for the ad-hoc and in-depth interviews. Observations of students in both the online and in the face-to-face environments allowed the gathering of first-hand information about social processes in a naturally occurring context (Silverman, 2006). My role within the VLE continually changed from participant to observer and vice-versa according to the

circumstances. At particular times, in the informal online chats, I was an online participant, joining in informal discussions to encourage learner participation and establish good rapport. At other times, I stood at a distance and observed the students interacting, discussing and helping each other. Records of students' access to the VLE and of their online participation in activities were also included in the journal.

3.11.2 The tracking system in the VLE

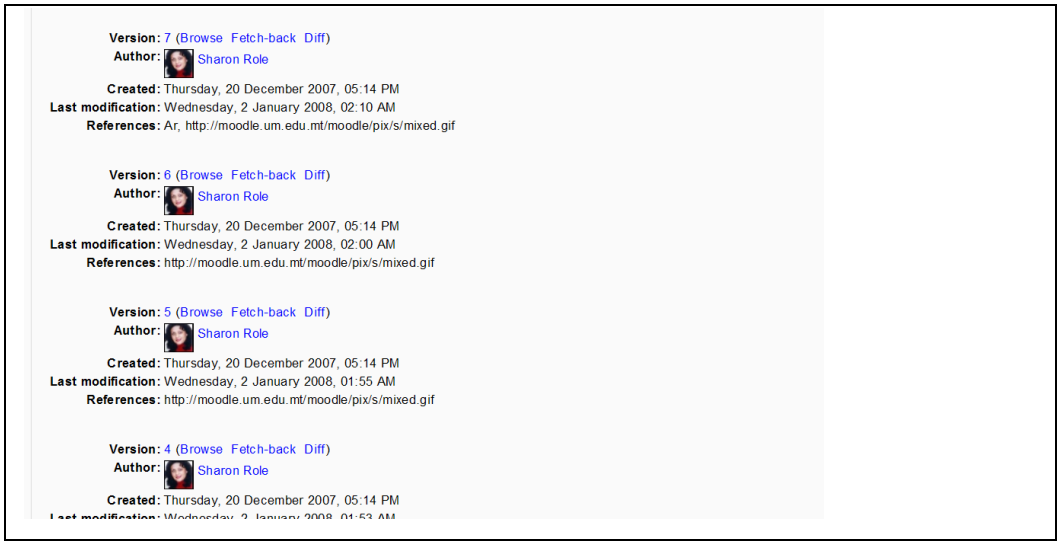

Figure 3.1. Screenshot 1 (VLE): Part of a history report in a wiki

The VLE which was used to provide the online medium was Moodle Version 6.1. The student tracking system gave a detailed record of the access time and the duration of each participant's contribution. The tracking system could be accessed from three different sources:

- the reports section in the administration block;
- the logs section in the activity reports for each participant in the participants area;
- the history section of individual activities, e.g., wikis (Figure 3.1).

3.11.3 Questionnaires:

Three anonymous questionnaires: a learner profile questionnaire, an early stages questionnaire and a middle stages questionnaire were given to the students.

(i) The learner profile questionnaire (Questionnaire 1: Appendix III) was a front-end analysis (Driscoll, 2002; Smith and Ragan, 1999; Dick and Carey, 1996) questionnaire designed to explore issues regarding:

- the availability of computers and Internet connectivity at the students' homes;
- the target audience in terms of comfort and skills in using technology.

Questionnaire 1 was given to the students before the start of the online course and consisted of 13 questions. Questions 1 and 2 concerned personal details, i.e., age and gender whereas, questions 3 to 13 concerned the use of technology. Five questions were closed-ended, one question was open-ended, four questions were matrix questions with a rating scale and three questions required a short answer.

(ii) An early stages questionnaire (Questionnaire 2: Appendix IV) was given to the students, in Week 7, to gauge the students' engagement with the VLE, and the developing attitudes towards the new modes of learning. It had 10 questions. The first two questions were personal detail questions and the others probed into the students' ongoing experiences of the online collaborative activities. There were two short answer questions, one choice question and five free response questions.

(iii) A middle stages questionnaire (Questionnaire 3; Appendix VI), given to the students in Week 18, was essential to provide a general feel of the whole class in terms of their enthusiasm, participation and roles in online collaborative activities. It is believed that there is a tendency for enthusiasm and productivity to decline during the middle stages of a course (Matthews, 2000). Questionnaire 3 consisted of 19 questions. Questions 1 and 2 were personal detail questions and the rest enquired about the students' experiences and roles in the online activities regarding collaborative learning. There were five multiple choice questions, 10 free response questions and 3 short answer questions.

3.11.4 Text-chat in the informal discussions and reflections journal

Two informal asynchronous discussion threads in the informal chat forum and a students' personal journal were set up in the first week in the VLE. The two discussions in the forum were called 'First Impressions' and 'What do you think about group work?'. The aim of the discussion threads was twofold:

- to explore the students' perceptions and attitudes towards collaborative learning and the use of the online medium for learning;
- as ice-breaker activities, to familiarise the students with discussing and posting in the VLE.

The student's personal reflective journal (Appendix V) was a tool embedded in the VLE and was used in the fifth week of the course. Students responded to eight free response questions regarding their first experience of group work in the first online collaborative activity. The students were asked to reflect on their experience. Each student posting in the personal journal was shared by the student and the teacher only.

3.11.5 Group meetings

Two ad-hoc group meetings and two focus group meetings were carried out in this study. The participants were assured that their real names would not be used in the research and were reminded to consider me as a researcher and not as a teacher during the group meeting. The meetings were conducted in a combination of languages: Maltese and English. The two focus group meetings were recorded. The audio recorder was tested in the meeting room with two students, two days before the scheduled appointment to ensure that the recorder was sensitive to the acoustics of the room and that it worked well.

3.11.5.1 The two ad-hoc group interviews

Each of the two ad-hoc group meetings took place in Week 8 in Phase 1 (December 2007) of the research, with a different group of criterion selected students (Miles and Huberman, 1994) after the face-to-face lectures. The students in these groups had rarely or never accessed the VLE. This is an example of purposeful sampling. Purposeful sampling decisions are taken by

qualitative researchers (Morse, 2006, Creswell, 2007, Miles and Huberman, 1994) to ensure enrichment and elaboration of the relevant data (Flick, 2002). Purposeful sampling maintains direction; participants are chosen because 'their perspectives are judged to be worth knowing and of value to the research' (Tobin, 2006 p.22).

The selected students accepted to take part in these meetings. Each meeting lasted 40 minutes. The aim of each meeting was to understand the students' stance with respect to online participation and to encourage the students to participate in the online collaborative activities.

3.11.5.2 The two focus group meetings

The two focus group meetings were conducted in Weeks 23 and 24 (April, 2008) in Phase 3. 'Focus groups allow multiple voices to be heard at one sitting,' (Smith, Flowers and Larkin, 2009, p.71). The students in the class were asked to volunteer to take part in the focus groups. I wanted to give as many students as possible the opportunity to discuss their experiences within a group, and to experience the benefits of being part of a focus group (Tobin, 2006). Six students volunteered to participate. Then fourteen other students were approached to form part of one of the focus groups. I took the opportunity to purposely select the students to have maximum variation (Lincoln and Guba, 1985; Miles and Huberman, 1994; Wellington, 2000). All students accepted the invitation. The students in each group displayed different online participation behaviours, ranging from very active to passive online learning. The aim of the focus group meetings was to allow students to discuss their experiences of collaborative online learning and to identify issues which would inform the questions to be asked in the individual interviews. The two focus groups were held when all the members of the group and the teacher had no lectures at the college.

In the focus group meetings, I took on the three roles of facilitating, monitoring and maintaining an ethical environment (Smith, Flowers and Larkin, 2009). A question schedule (Appendix VII) was prepared for the focus group meetings to facilitate the discussion. The question schedule contained questions, prompts and scenarios which were open-ended and would offer opportunities

for all participants to engage in discussions (Smith, Flowers and Larkin, 2009). I facilitated the group discussion as I dealt with the question schedule, listened attentively and stood back to allow group dynamics to emerge (Silverman, 2006). I monitored the discussion by listening to what was being said and who was saying it, prompting for more information, following up interesting points and involving the quieter participants. I also maintained a reasonable and ethical environment, ensuring that all participants were respecting each other (Smith, Flowers and Larkin, 2009). The duration of each focus group meeting was one hour.

In the focus groups, students had time to reflect before speaking, and members generated discussions which produced insights and relevant data on the learners' experiences of online learning. As discussions progressed, the recounted experiences of one individual stimulated others (Krathwohl, 1998) to discuss their views. Besides capturing these otherwise silent voices, a multiplicity of perspectives was also acquired. The students also acquired opportunities to benefit from each others' recounted experiences.

On the other hand, focus groups present some disadvantages, such as:

- some students may feel dominated by others; they may have opinions contrary to those of the majority of the group and do not express them;
- the time for reflection may also result in carefully censored responses from the participants.

The conduction of individual interviews (Section 3.11.6) compensated for these disadvantages.

3.11.6 The individual interviews

Interviews are opportunities 'to enter the participants' lifeworlds' (Smith, Flowers and Larkin, 2009, p.58). All the students in the class were invited for individual interviews. This methodology is similar to the 'big net approach' as recommended by Fetterman (1998). In-depth interviews were conducted with a group of twelve students. Students were given appointments for interviews when they did not have lectures at the college. The interviews took place in a quiet and undisturbed classroom, and were conducted in May and in June 2008.

During each interview, students were reminded that their names would not appear in the report and to consider me as a researcher and not as their teacher. One student was unable to attend College for the scheduled interview and the interview was replaced by an online meeting using Skype (VOIP medium). Two students, who missed their first and second appointments, did not ask for a third appointment, and were not interviewed. All the students, who were interviewed, gave their consent for the interviews to be recorded. Three students preferred to be interviewed in English, whereas thirty-two students preferred to be interviewed in Maltese.

Principles from interpretive phenomenological analysis (IPA) were applied in the interviews. This approach which makes use of the interview-plus concept, i.e., using artefacts as prompts in the interviews, has been used in JISC studies which concerned students and the use of technology (Mayes, 2006a; Creanor et al, 2006).

IPA is a method which has been informed from three key areas of the philosophy of knowledge, which are phenomenology, hermeneutics and idiography (Smith, Flowers and Larkin, 2009). In a phenomenological study the individuals and the researcher become 'the main research instruments' (Wellington 2000, p.134). The researcher develops an insider's perspective on the phenomenon (Bruyn, 1966; McCracken, 1988) by listening to the participants' stories and 'prioritises the participants' world view at the core of the account' (Reid, Flowers and Larkin, 2005, p.22).

IPA entails a double interpretive mechanism or 'double hermeneutic process' (Smith and Osborn, 2003, p.53): the interpretation of the experiences by the learners themselves and the understanding and interpretation of the researcher. The researcher captures the stories as told by the participants and analyses the contents. The researcher attempts to make sense of the participants' experiences and clarifies them to answer the research questions and to develop a new vision of the world.

IPA is committed to the particular (idiographic) and has an experiential focus on the participant as the expert (Mayes, 2006b). The learners in this study were the experts on their own experiences and could account for their behaviours.

They offered an understanding of their thoughts, commitments and feelings through telling their own stories, in their own words (Sfard and Prusek, 2005), and in as much detail as possible (Reid, Flowers and Larkin, 2005).

The interviews were semi-structured and an interview schedule was prepared for each student. The interview schedule shaped the interviews, but the students were given the space to move away from the schedule as they talked about their experiences. This at times led to unexpected revelations.

Each interview schedule for each student had the same framework (McCracken, 1988) consisting of:

- a set of biographical questions;
- a series of question areas, (grand tour questions);
- probes and prompts which were specific for each student and were used if more detail was needed.

Each interview started with small talk and biographical questions, e.g., previous school, hometown, family and responsibilities at home. These biographical questions set the scene for comfort. They allowed me to become familiar with 'the simple descriptive details of an individual's life' (McCracken 1998, p.34), to maintain a good rapport with the student and to help the student feel comfortable to speak. These initial discussions which were of a broad nature, set the context for more specific questions.

Each interview schedule had the 'grand tour' questions which were the essence of the interview (McCracken, 1988). The grand tour questions were different for each student. These were specifically prepared for each interview after reviewing the particular student's online involvement such as:

- postings in informal and formal discussions and in the personal reflection journal (from observations and VLE tracking system);
- VLE access record (from the VLE tracking system);
- statements which the student uttered in unsolicited chats, ad-hoc or focus group meetings (from observations/researcher's journal and transcripts).

Floating prompts, e.g., repeating the last word of the respondent in an enquiring tone at the end of the respondent's utterance and planned prompts (McCracken, 1988) were used to encourage the learners to add details which did not emerge in the grand tour testimony. Planned prompts included:

- asking learners to recall exceptional incidents;
- using artifacts (interview plus concept), e.g., extracts from the students' postings (Sharpe et al, 2005 ; Mayes, 2006a; Creanor et al, 2006).

The students were given time to reflect and answer. At times, a silence was a cue for the student to continue to speak about the online experience.

As a researcher, I sought to stay as 'low' as possible in the interviews and it was important that a question did not supply the answer which it solicited (McCracken, 1988). 'For most of the part, the participant talks and the interviewer listens' (Smith, Flowers and Larkin, 2009, p.57). While I listened to the student voices with great care, I was paying attention to key terms and observed the respondents' facial expressions. The interviews were recorded and I made notes of the students' facial expressions and particular remarks. In some cases, the conversation continued after the recorder was switched off and important points were again noted on paper. The participants provided a large amount of data, enriched with personal experiences and interpretations of meanings. Most students showed a willingness to be contacted if further discussions were necessary.

The students were expected to have unique online participation patterns and different stories to tell in their own terms. Two types of interviews were conducted: the short interviews and the in-depth interviews.

(i) The short interviews

Each short interview lasted around 45 minutes. The narrations of twenty-three students were important to address the first research questions (sub-questions 1.1 and 1.2), which concerned online behaviour patterns and factors which affected online participation.

(ii) The in-depth interviews

The in-depth interviews were conducted with a criterion-selected group of twelve students (Miles and Huberman, 1994; Creswell, 1998). Each interview lasted around 75 minutes. The grand tour testimony included questions which focused on all research questions. The students explained the meanings of their experiences in detail and responded well to the use of artifacts (interview plus concept), e.g., extracts from postings or face-to-face discussions.

3.12 Integrating the data generation methods within the course

This section gives an overview of the integration of the data generation methods within the course.

3.12.1 Phase 1

Table 3.3. The online activities and data generation in Phase 1

Date	Mode	Online activity
October	**Questionnaire 1 – Technology profile questionnaire**	
November	large group (IB)	Informal discussions
	Wk 1-2: Informal discussion - First Impressions (IB) **Wk 2: Informal discussion- What do you think about group work (IB)**	
	Individual (IB)	Your favourite Periodic Table
	large group (IB)	Useful sites in chemistry
	small groups	Radioisotopes
	Week 5: Personal Reflections Journal	
	large group	Limiting Reactants: problem solving/Virtual Lab
December	large group	Titrations: problem solving/discussion
	Week 7: Questionnaire 2- Early Stages questionnaire	
	large group	Atomic Structure: Quiz and discussion
	Week 8: Two Ad-hoc group meetings	
	Small/large group	Atomic Structure: Problem solving/discussion

Table 3.3 shows the ten online activities which were implemented in Phase 1. It also lists the six data generation methods which included Questionnaire 1, two online informal discussions, the personal students' reflective journal, Questionnaire 2 and two ad-hoc group meetings. The online activities in this phase were five Ice Breaker activities which served as socializing and familiarization events (Salmon 2000; Conrad and Donaldson 2004), four asynchronous large group discussions, and two small group problem-solving activities in wikis.

3.12.2 Phase 2

Table 3.4. Online activities and data generation methods in Phase 2

Date	Mode	Online activity
January	Individual/large group	Bonding: Quiz/discussion
	Large group	Shapes- Problem solving/discussion
	Small/large group	Bonding: Problem solving/discussion
February	Large group	Bonding: further discussions/problem solving
	Week 16: Questionnaire 3- Middle stages questionnaire	
	Small/large group	Redox: Problem solving/discussion

Table 3.4 lists the online activities and the data generation method (the middle stages questionnaire) in Phase 2. The online activities included: five large group discussion activities in fora, two small group problem-solving activities in wikis, and one individual activity (quiz).

3.12.3 Phase 3

Table 3.5 shows the online activities and the data generation methods (two focus groups and individual interviews) in Phase 3 (March 2008 to June 2008) of the study. The online activities included: eight large group discussion activities, two small group problem-solving activities in wikis, and three individual activities.

Table 3.5. The activities and data generation methods in Phase 3.

Date	Mode	Online activity
March	large group	Gases: discussion
	Individual/large group	Gases: Quiz/discussion
	Individual/large group	Gases: Quiz/ discussion
	Large group	Gases: problem solving/discussion
April	Small group	Chemical terms: Glossary
	Week 23: Focus Group 1	
	Week 24: Focus Group 2	
	Individual/large group	Equilibria: Quiz/discussion
	Small/large group	Equilibria: Problem solving/discussion
May	Large group	Periodicity: discussions
	Large group	Qualitative Analysis: discussions
	Week 28-34: Short Interviews	
	Week 28-34: in-depth interviews	

3.12.4 Tools used in all phases

The following data generation instruments were used throughout the three phases of the study:

- Teacher/researcher's journal-observations, reflections and development of ideas;
- Regular unsolicited discussions;
- VLE tracking system.

During all phases, the online environment was kept active with the students and the teacher contributing to the informal and formal areas of the VLE. As the above account indicates, the online activities included quizzes, discussions in fora, a lab simulation and problem solving activities in wikis and fora. The students were also provided with some short PowerPoint presentations (with voice over) on difficult sections of the syllabus, and some short articles.

3.13 Data treatment

Wellington (2000, p.134) describes qualitative data as lengthy and verbose and states that 'data analysis is part of the research cycle and not a discrete phase near the end of a research plan'. Data capture, data inspection and data treatment were ongoing processes in this study (Frankfort-Nachmias and Nachmias, 1996; Miles and Huberman, 1994).

NVivo 8, a computer assisted qualitative data analysis software (CAQDAS) was used to store the data and support the data analysis. This ensured that all data and analysis of the research were in one place; therefore the access, the treatment of data, and the retrieval of data or documents connected with the study were facilitated. Every week copies of the content in NVivo were saved on external memories as back-ups. The following gives an account of the data which was saved in NVivo.

(a) The researcher's journal

Relevant data from the journal was identified, copied and saved in NVivo. This data included observations of learners in the online and in the face-to-face environments, unsolicited discussions with students, emails from some students, notes from the ad-hoc student meetings, focus groups and individual interviews, significant extracts from particular postings in the VLE and tracking data from the VLE.

(b) The three questionnaires

Student anonymous responses from each of the three questionnaires were tallied using Excel software and the results were transferred to NVivo. Answers to open ended questions in the questionnaire were manually copied in NVivo.

(c) The online informal chats, two ad-hoc interviews and student online reflective journal

The data generated from the above was copied, pasted and saved in NVivo.

(d) The two focus group meetings and thirty-five individual interviews:

After each meeting or interview, digital sound data files from the recorder were uploaded to the computer using a voice editor software. The recordings were saved as audio files and linked to NVivo. A verbatim transcript of each recording was made and also saved in NVivo. Since I was the interviewer and knew the respondents well, I felt that no other transcriber would be able to produce a better scenario of the interviews or meetings in text form, than myself. As I transcribed the recordings, I could still visualise each student's facial expressions. As Miles and Huberman (1994) suggest, I enriched the text, with such descriptions, and the occasional notes and references which I took during the meetings and interviews. The transcription of the focus group meetings and the coding (Section 3.14.1) were completed before the start of the individual interviews. Transcription was a laborious process which took four months. One hour of tape took an average of 6 hours of transcription time. The questionnaires were mostly answered in English. However, the focus group meetings and the thirty-two interviews, which were conducted in Maltese, were not translated into English, but transcribed and saved in NVivo in their original form. This was done for two main reasons: (1) a translation might have caused a loss of some of the expressive utterances and (2) the process of translation would have been time-consuming.

The following section describes further treatment of the data which was saved in NVivo.

3.14 Data analysis: the stages

McCracken (1988 p.42) states that 'the object of analysis is to determine the categories, relationships and assumptions that inform the participant's view of the world in general and the topic in particular'. Wellington (2000, p.136) describes data analysis as 'messy and complicated' and advocates immersion and reflection stages as the first two stages. Thus, for every episode of data analysis, I read each document several times immersing myself in the details to obtain again a sense of what is written and a feeling of being part of it. I made notes and reflected writings as a memo attached to each document. Then I reflected on the emerging data, noting the themes and ideas which came to mind, and which at this stage were vague and unconnected.

The process of data analysis in this research can be summarized using the stages as listed by Wellington (2000).

(1) Immersion;

(2) Reflection;

(3) Analyzing and coding – taking apart, selecting and categorizing;

(4) Synthesising and re-combining nodes; forming tree nodes;

(5) Locating - relating to other work in literature;

(6) Reflecting and reviewing.

3.14.1 Coding the data

The next stage involved taking the data apart (Wellington, 2000; McCracken, 1988) or 'dissecting' it (Frankfort-Nachmias and Nachmias, 1996, p.293) and coding it.

Coding is an ongoing process, which reduces the data to categories. The codes, however, retain a pointer to the original data, ensuring access to the original documents (Richards, 2005). The saved data in NVivo was read thoroughly; each piece of information or statement which had a particular meaning, hence called a unit of meaning, was coded. In some cases, this was a word, a phrase, a sentence or a small paragraph.

Table 3.6 lists the three levels of the coding process (McCracken, 1988; Richards, 2005) which was used in this research.

Table 3.6. The three levels of coding

Level	**Coding**	**Process**
1	Descriptive and topic coding (free nodes)	Reading through transcriptions
2	Analytical coding (free nodes)	Interpreting and understanding
3	Formation of tree nodes	Revealing patterns and relationships

I illustrate the various levels of coding by using an extract from an in-depth interview with a student named Celine.

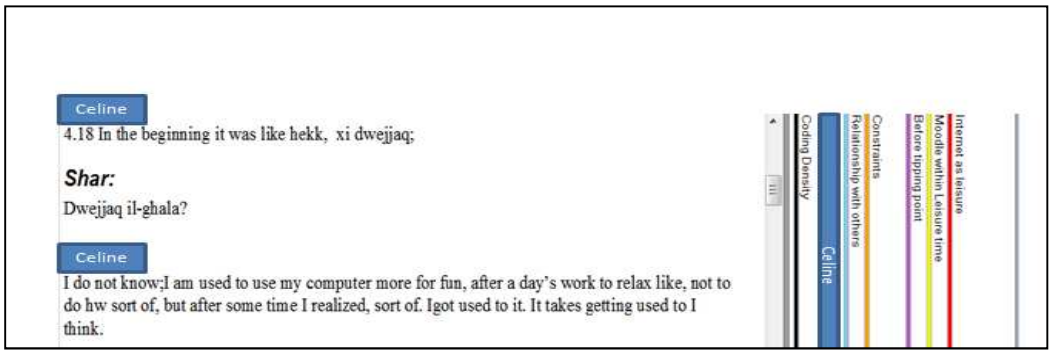

Figure 3.2. Screen shot 2 (NVivo): A unit of meaning with coding

Descriptive and topic coding constituted the first level of coding. This coding picked out data from the text which concerned attributes of and information about an object, case or person.

The codes in NVivo are colour tagged, and appear on the right hand side of the text-page (Figure 3.2). The above section was considered as a unit of meaning (8 lines). It was topic coded 'Internet as leisure' (red vertical line in screen shot 1) and 'Moodle within Leisure time' (yellow line) and 'Before tipping point' (purple line). At the end of the analysis, there were eight units of meaning from five different students with codes called 'Internet as Leisure'. Thus a node or category with eight units of meaning coded 'Internet as leisure' was automatically created in NVivo. Each unit of meaning in the node could be easily traced to the original text.

The codes given to the units of meaning in NVivo were a-posteriori codes (Wellington, 2000), i.e., codes derived from the data itself during the coding process. For example, 'Internet as leisure' was an a-posteriori code because it emerged from readings of the transcription during topic coding.

All topic and descriptive coding initially formed free nodes. This was the first stage in the reduction of the data. Free nodes allow the capture of ideas but do not impose any structure or relationships (Bazely, 2007).

At the second coding level, the transcripts were read again, examined carefully and analysed for analytical coding. Units of meaning in the transcript were coded once more to form free analytical nodes (McCracken, 1988). Analytic

coding of units of meaning is the result of interpretation and reflection on meaning.

> The object here is to extend the observation beyond its original form until its implications and possibilities are more fully played out.
>
> McCracken, 1988, p.45

In the above example in Figure 3.2, the unit of meaning was analytically coded ‘Constraints’ (orange vertical line). Other units of meaning formerly coded differently, e.g., Technophobia were also analytically coded ‘Constraints’. Thus, different categories formed at the first level of coding were further categorised together in themes. Analytic coding is central to qualitative enquiry, because at this level, nodes which express new ideas or concepts about the data (McCracken, 1988) are created.

At the third level of coding, analytical nodes were carefully inspected and refined. The analysis consisted of a total of 190 analytical and remaining free topic nodes. Recombining and synthesizing of data took place at this stage (Wellington, 2000). Different nodes were contrasted for similarity and contradiction. Similar nodes were recombined. Large nodes were split according to identifiable dissimilarities. Old nodes were reviewed and very often rearranged or discarded. New nodes developed as new patterns, connections and relationships were recognised. New themes, relationships and patterns were noted. Tree nodes were created at this level of coding to show connections and relationships. The tree nodes were created by drawing or listing categories together.

Tree nodes represented themes, where each tree node is a collection of nodes which are connected due to the formation of a pattern or relationship. For example, in Figure 3.3 the node ‘Internet for Leisure’ is a category in ‘Constraints’. ‘Constraints’ is a category in Tree node ‘Behavioural issues’. ‘Internet for Leisure’ is also a category in Tree node ‘Attitudinal issues’.

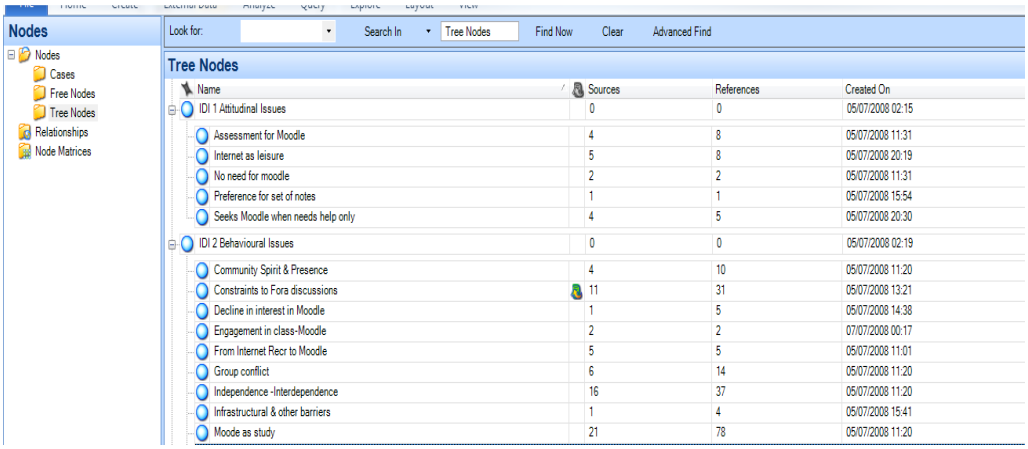

Figure 3.3. Screen shot 3 (NVivo): Tree nodes- Attitudinal and Behavioural issues

After the three levels of coding, the transcript as 'data' had been reduced (Miles and Huberman, 1994) to free topic and free analytical nodes and then to tree nodes. The focus of the study was no longer primarily on the original transcripts, but had shifted to the newly developed analytical categories (McCracken, 1988) though these were continually referred back to. The original data in my research has been reduced to 190 nodes and then to five main tree nodes or themes: Attitudinal Issues, Behavioural issues, Learning issues, Personality and Identity issues and Perception issues (Figure 3.4). There were also some remaining free topic and analytical nodes.

The last stage in data analysis involved comparing and contrasting the patterns and relationships to other work in the literature (Wellington, 2000). This involved more reflective and interpretation processes, which resulted in the writing of Chapter 5.

3.14.2 Models and Vignettes

NVivo also facilitated the construction of models and the writing of vignettes.

Models: The coded data in NVivo was used in the drawing of concept maps, diagrams and relationships (Figure 3.4). Concept mapping and data retrieval were continually used in the planning and writing of Chapter 5.

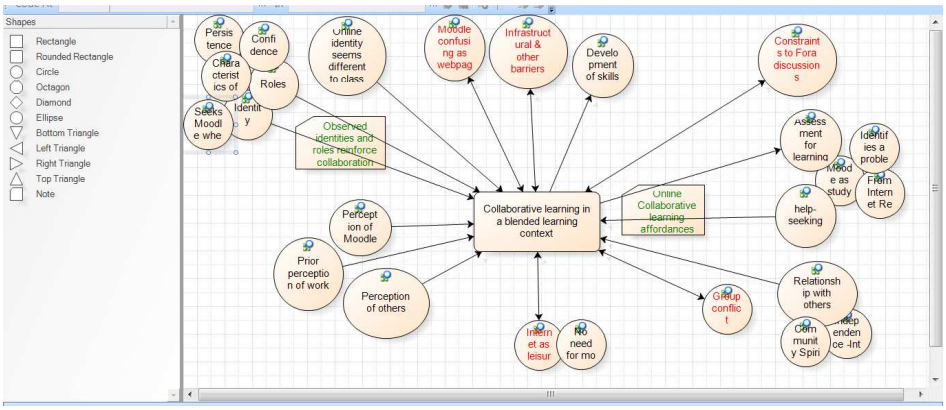

Figure 3.4. Screen shot 4 (NVivo): Models

Vignettes: A vignette has a 'narrative, story-like structure that preserves chronological flow' and displays a vivid, compelling and persuasive interpretation (Miles and Huberman, 1994, p.81). NVivo facilitated the process of writing a vignette for each of the twelve students who were interviewed in-depth (Section 3.12.6). Some of these vignettes or extracts from them are presented in Chapter 5 (Section 5.5.4.2.2; 5.8). This process helped me further to familiarise myself with the online experiences of each of the twelve students. It was essential to address the research questions, especially the research sub-questions 2.1 and 2.2 which concerned changes in the students as learners.

In my study, the single and tree nodes in NVivo served as a systematic storage of the data, as a reduction process of the data and as an easy retrieval system.The intense coding treatment of the data gave me a deep understanding of the students' experiences of online participation. As a result of the reduction of data processes, I came to know the data well and was able to use it and retrieve it in the discussions in Part V of Chapter 4 and in Chapter 5.

3.15 Conclusion

This chapter has outlined the research methodology. An interpretive phenomenological approach framed this research, where multi-methods of investigation were employed to give a rich picture of the case under study and to ensure credibility. This chapter has provided an extensive account of the data generation methods, discussed the research trustworthiness strategies and

described the data storage, management and treatment processes. NVivo 8 supported the organisation of all the data and served as a storage and retrieval system for the discussions in Chapter 4 and 5. The analysis of the data generated from the three questionnaires, ad-hoc meetings, students' reflective journal, online informal fora, VLE tracking system and the two focus group meetings, is presented in Chapter 4. The data from the individual interviews is discussed in Chapter 5.

Chapter 4: Findings and analysis

4.0 Introduction

In this chapter, I present the findings from Phase 1, Phase 2 and from the focus group meetings in Phase 3. This chapter consists of five main parts. Part I is an overview of the research methods, the online learning activities and the research questions. Part II presents an analysis of the data which illustrates who the students were before they started the online course in terms of their familiarity with technology and their perceptions of online collaborative learning. Part III discusses the extent of student participation in the online tasks. Part II and Part III set the context for Part IV, which reveals the data generated as learners' voice in the questionnaires and the group meetings. Part V concludes this chapter with a discussion of online learning behaviour patterns.

Part I - An overview

4.1 Research methods and research questions

Part 1 is a brief review of the three phases of the research, indicating the research methods which corresponded to each phase. It also presents the research questions and indicates where these questions were addressed.

4.1.1 The research methods

Table 4.1 lists the data generation methods which were used in the three phases of the main study (Section 3.13) and serves as a quick reference point for other sections of the chapter. Phase 1, Phase 2 and Phase 3 corresponded to the academic Term 1, Term 2 and Term 3 respectively. This chapter focuses mainly on the data generated as learners' voice from Week 1 to Week 24.

Table 4.1. Timeline: The data generation methods

Phase	Week	Research method
< 1	< 1	Questionnaire 1: profile questionnaire
1-3	1-32	Researcher's journal
	1-32	VLE tracking system
1	1-2	Informal online fora
	5	Student's reflective journal
	7	Questionnaire 2: early stages questionnaire
	8	Two ad-hoc group interviews
2	16	Questionnaire 3: Middle Stages questionnaire
3	23-24	Two focus group meetings
	28-34	23 Individual interviews; 12 in-depth interviews

4.1.2 Addressing the Research Questions

Two overarching research questions directed this study. The first research question which is expressed as sub-questions 1.1 and 1.2 is:

What were the experiences of students following an online collaborative program in a blended learning context?

The second research question which is expressed as sub-questions 2.1 and 2.2 is: what was the impact of these experiences on the learners?

Table 4.2. The research questions as addressed in Chapter 4

Research Questions		Discussion
1.1	What were the online behaviour patterns of the learners following a blended course?	Ch 4:III, IV, V
1.2	What factors influenced online behaviours in a blended learning context?	Ch 4: II, IV
2.1	How did online participation change the students as learners?	Ch 4: IV (& in Ch 5)
2.2	What was the impact of online learning on the learning identity of the learners in the online and the face-to-face class?	(discussed in Ch 5)

Table 4.2 indicates the research questions and the parts in Chapter 4, where these questions are addressed. This chapter is mostly concerned with

addressing the first research question (RQ: 1.1, 1.2), which concerns the exploration of the students' experiences, including the factors which affected their behaviours.

Part II

4.2 Presenting the students

Part II portrays the profile of this class of learners regarding their familiarity with computers, online learning, the Internet, other technologies and collaborative work. This data was generated from Questionnaire 1 (Section 3.11.3), and from two informal online discussions in the VLE (Section 3.11.4). Knowing who the students were at the beginning of the course was a front-end analysis process which formed a baseline for comparisons with data generated at later stages.

4.2.1 The student profile questionnaire

Questionnaire 1 (Section 3.11.3(i)) is a student profile questionnaire (Appendix III) which was given to the students in the class before they commenced the online course (October 2007). All students answered the first questionnaire. Their responses, with respect to prior experiences of technology threw light on their readiness for online learning.

Questions 1 to 5 revealed that in this class of 37 students (25 females and 12 males), all students were 16 years old except for one male student who was 18 years old. All students had a computer and Internet connection at home. Only one student commented about limited Internet connectivity at home. Two students had been using the Internet for the past year. The other students had been using the Internet for more than two years.

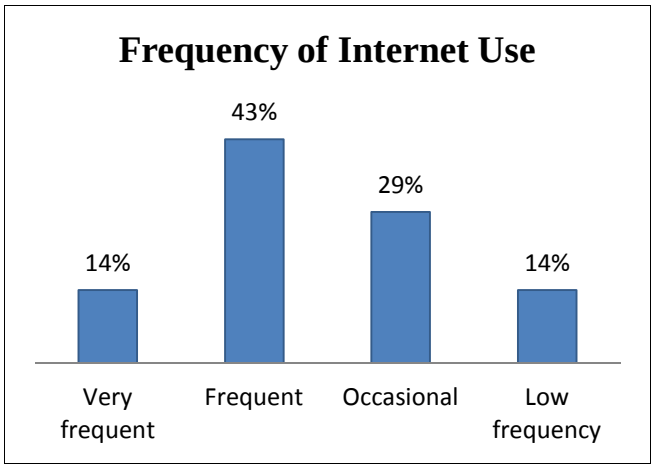

Figure 4.1. Frequency of Internet use

Questions 6 and 7 concerned the frequency of use of the Internet. The results are shown graphically in Figure 4.1. 14% of the class (5 students) used the Internet very frequently, spending more than 21 hours weekly on the Internet; 43 % (16) were frequent users spending from 11 to 20 hours per week on the Internet, whereas 29% (11) were occasional users spending from 4 to 10 hours on the Internet. 14% (5) were low frequency Internet users spending less than three hours per week on the Internet.

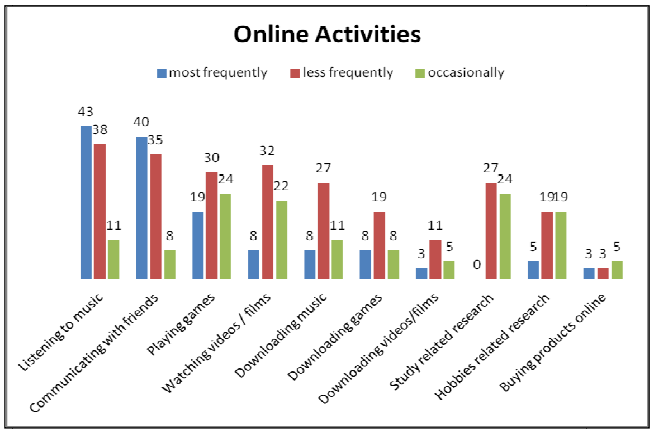

Figure 4.2. Online activities (Values are percentages)

Figure 4.2 illustrates the responses to question 8. The most common Internet activities for these students were listening to music (81%) and communicating with friends (75%), followed by playing games (49%). Other activities

included watching videos and movies, downloading music, movies and games and doing research related to study or hobbies.

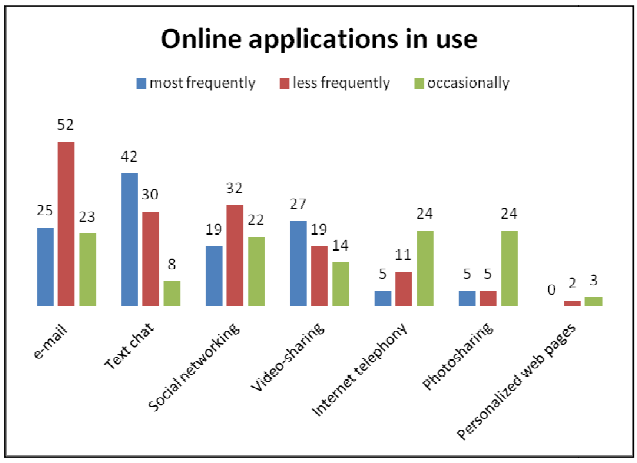

Figure 4.3. Online applications in use

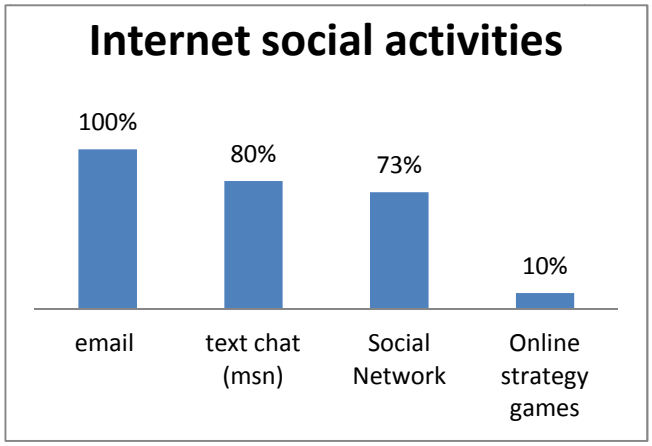

Figure 4.4. Internet Social Activities

The response to Questions 9 and 10 showed that all students used email and twenty-six students (80%) used real-time text chat (Figure 4.3). Twenty-one (73%) students were involved in social networking and four students (10%) were online strategy game players (Figure 4.4).

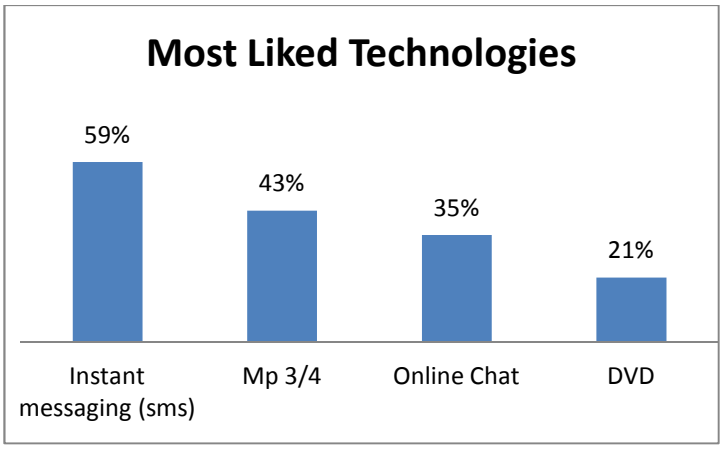

Figure 4.5. Most liked technologies

The answers to Question 11 (Figure 4.5) revealed that the technologies which were mostly liked and used by the students were instant messaging (22 students; 59%), mp3/4 (16 students; 43%), online chatting (13 students; 35%: mainly msn), and DVDs (8 students; 21%).

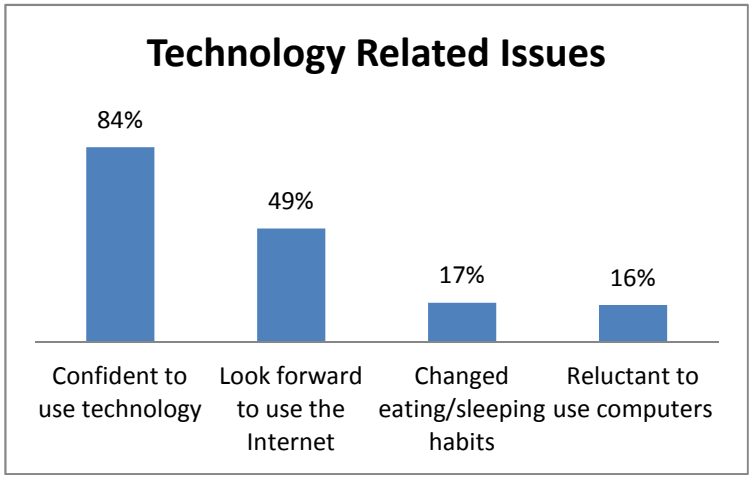

Figure 4.6. Technology related habits

The responses to Question 12 (Figure 4.6) indicated that thirty-one students (84%) felt confident to use computers and other technologies and eighteen students (49%) felt that they looked forward to use the Internet. Six students (17%) declared that the Internet had changed their sleeping and eating habits. Six students (16%) indicated a reluctance to use computers.

4.2.1.1 Discussion

The data in this section showed that the students in this study had technology profiles similar to those of students of the same age reported in studies in the UK (JISC, 2007) and the US (NSBA, 2007). The students' responses were also similar to results obtained by Clark et al (2009), where 94% of students associated computer access with Internet use for social networking, leisure and entertainment.

All students in this class had Internet connections at home and a good percentage of the class was familiar with computers and the Internet. Twenty-one students (57%) seemed to have integrated the use of the Internet in their daily routines (Figure 4.1).

Some issues which might hinder online collaborative participation emerged.

1. One student had poor Internet connectivity;
2. Five out of 37 students rarely used computers and six students indicated a reluctance to use computers;

On a positive note, all students used e-mail, 32 students (86%) were Internet users, twenty-six students (80%) used text-chat and twenty-one students (73%) participated in social networks.

This section raises the following questions with respect to the engagement of students with online learning:

- Do frequent Internet users (n=21 in this class) who are involved in social networking make successful online learners?;
- Are students (n=6 in this class) who are reluctant to use computers disadvantaged in becoming online participants?

Some studies showed that although teenagers are described to be social and digitally connected (Prensky, 2001; Oblinger and Oblinger, 2005), they resist using technology for study (Section 2.2.1). The data collected in this research also sheds light on these issues (Section 5.3.2.3).

4.2.2 The students' perceptions of collaborative work and the VLE

In the first week of the online course, the students were encouraged to enroll in the VLE, and take part in three informal online discussions which were Icebreaker activities. Two of these discussions were designed to capture the perceptions of students regarding collaborative work and their first impressions of the online medium.

4.2.2.1 Views about group work at the beginning of the blended course

Although thirty students (80%) had enrolled in the VLE and twenty-one students (57%) posted in the informal discussion forum, only 8 students (21%) participated in the Ice Breaker (non-anonymous) forum called 'Group work'.

This discussion, which had 13 postings revealed that seven students were positive about group-work. They believed that they would enjoy working in groups. Nonetheless, all eight students raised both positive and negative issues, which are listed below. *(The numbers in brackets in all lists indicate the frequency of the statement being stated by different students.)*

Positive issues

- Group-work helps to get to know each other (4);
- Using the VLE to learn chemistry would be enjoyable as face-to-face classroom chemistry is boring (1);
- Working in groups is enjoyable (7)

Negative issues

- Not all members would contribute in group work, and yet, all members would obtain the same grade (2);
- The presence of lurkers would annoy the hard-working students (2);
- Organizing the work together would be time consuming (2);
- Chemistry was a difficult subject not suitable for group-work (1).

Few students participated in this discussion. This contrasted with the number of students commenting on group-work in the anonymous early stages questionnaire in Week 7 (Section 4.4.2.2).

4.2.2.2 The students' first impression of using the VLE

Five students (14%) took part in the forum called 'My first impressions', which had 9 postings. These students posted positive comments stating that the VLE was:

- a good idea to support learning (4);
- ideal for discussion (4);
- ideal for shy students to discuss (1);
- useful for students to get to know each other better, especially since at college there was not much time to meet other students (4);
- convenient for students to communicate via the Internet (3).

The students' response to this data generation method was poor compared to the response in the anonymous early stages questionnaire in Week 7 (Sections 4.4.2.1; 4.4.2.2).

4.2.3 A baseline in the study

Out of the thirteen students who participated in the two fora 'Group-work' and 'My First Impressions', only two students posted in both fora. Thus eleven students participated in the two fora and most of these expressed their enthusiasm in using the VLE and collaborative learning. Twenty-six students were silent in these two fora. Yet, the profile questionnaire showed that these students were e-mail, Internet, text-chat and social network users (Section 4.2.1.1).

Bassey (2002) remarked that in case study research, the researcher is where the action is, and it enables research methods to be continually evaluated. Different forms of data generation tools were required to look into the issues. Other research methods used in Phase 1, were the students' reflective journal and the anonymous early stages questionnaire (Q2). The findings are discussed in Part IV. In Part III, I discuss the extent of the student participation in the course. This gives the context for the findings presented in Part IV.

Part III

4.3 Student online participation

Part III discusses the active online environment which the majority of the students accessed from their homes. They participated in informal and formal discussions in the VLE where according to Gilroy (2001) pedagogy, content and community become knitted together in a unique learning experience. This section reveals the extent of online participation in terms of learner-generated content in both the formal learning and informal online activities.

4.3.1 An overview of the online activities

An overview of the online activities in the three phases with the integrated research methods was presented in Section 3.12. Table 4.3 indicates the students' activity in the small group and large group collaborative tasks, and in the individual activities.

Forty per cent of the online activities consisted of collaborative tasks involving the whole class (large group) in the asynchronous discussion fora. Another 40% of the activities consisted of collaborative tasks involving small group-work in the wikis and glossary. 20% of the activities consisted of individual work such as quizzes, Internet research, reading material and virtual lab tasks.

The activities in the VLE covered all nine topics in first year advanced level inorganic and physical chemistry syllabus. These were Amount of Substance, Atomic Structure, Behaviour of Gases, Bonding, Redox reactions, Equilibria, Chemistry of Groups 1 and 2, Qualitative Analysis and Periodicity.

The VLE also included an informal asynchronous chat area, where learners discussed issues which were not necessarily related to chemistry.

The extent of student participation is outlined in the next sections as participation in the first two weeks (Section 4.3.2) and in terms of learner-generated content (Section 4.3.3).

Table 4.3. Collaborative and individual online activities

Collaborative asynchronous tasks			
	Type of task	Activity	Content
1	Informal large group discussions (The Café) including three Ice breaker activities (excluding chemistry–related)	Twelve discussion threads with 193 postings	Informal socializing asynchronous chat
2	Twelve Formal learning discussion fora (large group) including 9 formal fora in Cafe	83 discussion threads: 475 postings	Chemistry topics
3	Sixty Wikis (small group)	6 different activities, each with 10 groups of students	
4	One Glossary (small group)	42 glossary entries by 10 groups of students	Chemistry topics
Individual tasks			
	One VLE Familiarisation activity (Choice task)		Choosing a Periodic table
5	Five Quizzes	On average 21 students per quiz; average 28 attempts per quiz	Gases (2) Bonding Atomic Structure Equilibria
6	One Virtual lab task (followed by large group discussions)	20 students	Amount of Substance
7	One Choice - Internet research activity	Accessed by 19 students	Ice breaker activity-Periodicity
8	Reading activities: Four PowerPoint presentations	Accessed by 32 students	Equilibria (2) Bonding Gases LR
9	Reading activities: Eight short articles	Accessed by 32 students	Gases Equilibria Bonding
10	Links to chemistry topic sites, online books	The VLE logs indicate frequent use of external links	All chemistry topics

4.3.2 Participation in the first two weeks

The design of the activities in the first two weeks of the course was aimed to motivate the students to use the VLE, to familiarise the students with navigation in the VLE, and to establish social presence (Section 2.1.3.1; Salmon, 2000; Levyck, 2008; Palloff and Pratt, 2009; Lehmen and Conceicao, 2010).Thirty students (80%) had self-enrolled in the first two weeks, but only nineteen students (51% of the class) posted in the four ice breaker activities. Table 4.4 shows the extent of participation in each Ice Breaker activity.

Table 4.4. Participation in Ice Breaker activities

Event No.	Icebreaker activity	Section	Type	Number of students Accessing event	Number of postings made by students
1	I am here	The Cafe	Forum	11	11
2	My first impressions	The Cafe	Forum	5	5
3	Group-work	The Cafe	Forum	8	9
4	Choose your favourite Periodic Table	Main Formal learning Section	Choices/Voting	19 (40 views)	5

One student participated in all four activities, whereas, thirteen students took part in one activity only. The participation in Ice Breaker activities 2 and 3 was discussed in Section 4.2.2. Participation in Ice Breaker activities 1 and 4 is discussed below.

Ice Breaker activity 1:

This was an informal asynchronous chat activity, called ‘I am here’. The students were asked to post a note indicating that they had successfully accessed the site. Eleven students posted the note, and ten of these students

included appreciative comments about the site such as ‘useful’, ‘helpful’, and ‘great’, indicating a positive reaction to this innovative mode of study.

Ice Breaker activity 4:

In this activity students were given different sites with different presentations of the Periodic Table and they were asked to vote for their favourite site. The VLE tracking system indicated forty views of the periodic table sites by nineteen students on different occasions in the first two weeks. Only five students posted their choice.

Eighteen students (49%) did not participate in any of the four above-mentioned Ice Breaker activities (Table 4.5). This lack of participation is reported in the literature. Mitchell and Honore (2006) found that students took time to accept online learning and become motivated. This was the case with some of the non-participating students in the first weeks of the online course.

4.3.3 Online learner-generated content

Most of the content in the virtual learning environment was generated by the learners in the discussion fora, wikis and glossary. The learner-generated content consisted of non-chemistry related content in the informal area ‘The Café’ and chemistry related content in formal learning fora, wikis and glossary. Three students preferred to post chemistry related content in the Café informal area. Copies of postings in the discussion fora were sent as emails to all participants. The following sections describe participation in the informal and formal learning areas and reveal some of the participants’ behaviours, thus addressing research question 1.

4.3.3.1 Informal discussion area

The asynchronous informal chat area 'The Café' evolved into a recreational section complementing the formal study work. As indicated in Table 4.5, this forum had 21 threads with a total of 227 postings, at the end of the course. 67% of the threads were initiated by the students. This area was instrumental in establishing social presence in the VLE.

Table 4.5. Discussion in The Café forum

Discussion Threads	Threads	Initiated by		Total posts
		Teacher	Learner	
Non-chemistry	12	6	6	193
Chemistry	9	1	8	34
Total	21	7	14	227

As shown by the following comment, the final interviews confirmed that the informal chat sections maintained motivation for many students to access the virtual learning environment:

> *'My greatest pleasure was in reading the discussions in The Café and post something myself…..Moodle for me did not just mean study work,' Francesca, individual interviews, May 2008*

The VLE tracking system showed that eleven students (30%) did not post in the Café fora. In the individual interviews, nine students gave the following reasons for their lack of participation in the Café:

- shyness (2);
- time constraints due to other commitments (6);
- the computer at home was needed by other members of the family (2).

4.3.3.2 Learning discussion area

The learner-generated content included chemistry-related tasks, which were posted and discussed in 12 discussion fora, 47 wikis and a glossary of forty-two chemical terms. These are discussed in this section.

(i) The discussion fora

Table 4.6. Discussion in the formal learning fora

	Discussion Forum	Teacher-initiated threads	Learner-initiated threads	Postings
1	Radioisotopes	5	6	42
2	Amount of substance	-	3	31
3	Atomic Structure	2	-	5
4	Past Papers (2 fora)	12	3	47
5	Bonding (2 fora)	15	1	78
6	Redox	1	3	34
7	Equilibria (2 fora)	8	4	114
8	Gas Laws (2 fora)	9	2	90
	Total	52	22	441
	Percentage	70	30	
	Average			43

Table 4.6 lists the chemistry topics in the same order as they were tackled in the face-to-face class and in the VLE. It indicates that 30% of the discussion threads were initiated by the learners. The eight discussion fora consisted of 74 threads and carried a total of 441 postings. The maximum number of postings in one forum was 114 (Equilibria forum) and the average number of postings in a forum was 43.

The individual interviews revealed that the two chemistry topics of equilibria (Forum 9) and gas laws (Forum 10) posed difficult concepts and complex mathematical calculations (Sections 5.5.4.2.2.iv, 5.8.2). This is reflected in the number of postings and the interest that was generated by the students in the respective sections of the VLE. As will be revealed in Part V, some students actively took part in whole-class discussions; other students followed these discussions through the VLE or emails and were using these to support their learning.

(ii) The glossary

This task involved researching and presenting the meaning of chemical terms in a glossary (Appendix XII). This was a tool embedded in the VLE. The class was divided into ten groups, where each group had to present the explanations of six concepts. The VLE logs indicated that 17 students entered the explanation of forty-two terms and 24 students viewed the terms in the glossary. Two groups, i.e., seven students, did not participate in this task; though three of these students viewed the glossary. Twelve students who did not take part in whole-class formal discussions used the glossary. Six, of these, inputted terms in the glossary. These were irregular VLE users, who seemed to participate in activities which did not require collaboration or much of it.

(iii) The wikis

Table 4.7. Participation in Wikis

No.	Topic in wikis	Group Formed by:	Date	Participation
1	Radioisotopes	Teacher	November 2007	All 10 groups
2	Atomic Structure	Students	December 2007	All 10 groups
3	Bonding 1	Students	January 2008	8 out of 10 groups
4	Gases	Students	February 2008	9 out of 10 groups
5	Redox reactions	Students	March 2008	9 out of 10 groups
6	Equilibria	Students	April 2008	8 out of 10 groups

Problem solving tasks were carried out by small groups of four or five students, in the wikis (Appendix XI). As Table 4.7 shows, the members of the groups, except for the first topic, were selected by the students themselves. As will be seen in Section 4.4.2.2, students in their responses in the online reflective journal and in the questionnaire, stated that they preferred to form groups by choosing the members of the group themselves.

Part III indicated the extent of the student participation in the informal and formal online activities and revealed some factors which affected online

behaviours (research question 1.2). In the first two weeks of the course nineteen students posted in the Ice Breaker activities, giving an average of 4.75 students per activity. Eleven students did not post in the informal discussion fora (The Café) due to shyness, commitments and unavailability of the computer. These informal discussions contributed to the social presence in the VLE. Many more students took part in small group-work in the wikis than in the whole-class group fora. Furthermore, six students who were usually reluctant to join collaborative large group or small group activities participated in the Glossary activity, which was more of a co-operative/individual task.

Part IV explores the data which was generated as learners' voice. The data reveals issues which explain some of the online behaviours.

Part IV

4.4. – The students as new learners

Part IV presents data generated from the data generation methods listed in Table 4.8 and brings to light the students' experiences of online participation or non-participation. It reveals (1) several factors which affected online behaviours (research question 1.2) as they emerged at different points of the course and (2) the changing students' online learning behaviours (research question 1.1), illuminating how the students changed as learners as they participated in the online course (research question 2.1).

As Table 4.8 indicates, a mixture of anonymous and non-anonymous research methods was used in the first and second research phases of the study. Anonymity was not maintained in the third phase (Section 3.11.2), where the research methods were two focus group meetings, 23 individual interviews and twelve in-depth individual interviews. Table 4.8 shows the students' response rate and gives the phase and week when the data was generated, the number of questions in each tool, the anonymity and the purpose of using the particular research tool. The data in Part IV was generated as learners' voice and this

triangulates the data generated in the interviews and which is presented in the discussion in Chapter 5.

Table 4.8. The data generation methods/details discussed in Part IV

Method	Phase	Week	Number of Questions	Anonymity	Response	Aim
Students' Reflective journal	1	5	8	Non-anonymous	46% n=17	To explore the first online group experience and developing attitudes
Early Stages Q	1	7	11	Anonymous	95% n=35	To explore ongoing online experiences and developing attitudes
Two Ad-Hoc meetings	1	8	(semi-structured protocol)	Non-anonymous	100% (n=4, 9)	To identify reasons for non-participation
Middle Stages Q	2	16	19	Anonymous	79% n=29	To explore ongoing online experiences, roles and developing attitudes
Two Focus Group meetings	3	24, 25	(semi-structured protocol)	Non-Anonymous	95% (n=10, 9)	To explore experiences, attitudes through student discussions

The next section gives an overview of the five research methods listed in Table 4.8. Section 4.4.2 discusses the issues, in relation to the use of the two innovations – online learning and use of the VLE (Section 4.4.2.1) and collaborative learning (Section 4.4.2.2), as they emerged at different points in time during the course (research question 1.2). It reveals gradual changes in the learners' behaviours and attitudes. Hence, Section 4.4.2.3 sums up the learners' voices in three categories - personal, social and technological.

4.4.1 The research tools

a. The students' personal reflective journal

In Week 5 of the study, the students were asked to reflect on their first online collaborative learning activity 'Uses and Applications of Radioisotopes' (Section 4.3.3.2 iii). This two-week online collaborative project was based on a guided discovery learning approach. The students in the class were divided into twelve teacher-selected groups.

A set of eight questions (Appendix V) was set in the personal reflections tool which was embedded in the VLE (Section 3.11.4). The aim of this research method was to explore the first online collaborative experience of the students in terms of their participation in the group and their developing attitudes towards collaborative learning. Seventeen out of thirty-seven (46%) students in the class submitted their reflections. These reflections were non-anonymous, but could only be seen by the author (the student) and the teacher.

b. The early stages questionnaire

This anonymous questionnaire (Questionnaire 2; Section 3.11.3.(ii)) was given to all the students in Week 7 (Phase 1) to obtain a general view of the students' ongoing experiences. Thirty-five students (95%) answered Questionnaire 2. This anonymous method generated more data about the online experiences than the non-anonymous personal reflections journal in Week 5 (17 students: 45%). Questionnaire 2 (Appendix IV) had 11 questions, where the first 2 questions were personal detail questions and the rest probed into the students' early online collaborative experiences.

c. Two Ad-Hoc Group meetings

Two ad-hoc meetings (Section 3.11.5.1) were carried out in Week 8, with students who were observed to be infrequent participants in the VLE, (Researcher's journal; VLE tracking system). The aim was to explore the reasons for their non-participation in the VLE and to encourage these students to participate in the VLE. The two meetings took place on a different day, immediately after a face-to-face chemistry class. The first group was composed

of four students, who were quiet and passive in the face-to-face class (Researcher's journal). The second group consisted of nine students, who did not seem very keen on learning, even in the face-to-face class (Researcher's journal; Section 3.11.1).

d. The Middle Stages Questionnaire

A middle stages questionnaire (Questionnaire 3) was given to the students in Week 16 (Phase 2). Questionnaire 3 (Appendix VI) consisted of 19 questions (Section 3.11.3(iii)). Questions 1 and 2 were personal detail questions and most other questions focused mainly on the students' experiences and roles in two selected small group online activities in the wikis. In the selected activities, the class was divided into ten student self-selected groups. The last two questions were of a more general nature concerning the use of the VLE and participation in whole-class discussions. Twenty-nine (79%) students answered Questionnaire 3.

e. The two focus groups

Twenty students were invited and accepted to attend either one of two focus group meetings. One student did not attend the group meeting. The two meetings took place in Week 23 and 24 respectively (Phase 3). The first group had ten students and the second group had nine students.

An interview protocol (Section 3.11.5.2; Appendix VII), was prepared for the focus group meetings. This was informed by the responses in the questionnaires and by my inquisitiveness which was developed through my observations recorded in the researcher's journal. The meetings turned out to be vibrant conversations of students narrating their online experiences and roles, describing their new study practices, and arguing about their likes and dislikes. The students talked, debated and reacted to each others' statements. Extreme variations in behaviours and attitudes, as also reported by Mason and Weller (2000), Sweeney, O'Donoghue and Whitehead (2004) and Ellis and Calvo (2004) in the literature, were observed in this study.

The students participating in the focus groups were contributors, participants or irregular users in the VLE. The contributors (n=5) visited the VLE regularly,

discussed in small groups, and with the whole class. The contributors gave vivid descriptions of their interactions in the VLE and their narrations in the focus group meetings were an encouragement for other students (n=4) to participate in the VLE. The participants (n=8) visited the VLE regularly, worked in small groups and on their own and used the VLE to check their work with the work that others discussed and presented. The irregular users (n=7) accessed and participated in the VLE occasionally. The key issues which emerged from this analysis of the two focus group meetings informed the semi-structured interviews, which took place in May and June 2008 (Weeks 28 to 32).

4.4.2 Emerging issues

The issues which emerged from the use of the above-mentioned data generating methods can be related to the two innovations which the students encountered – the use of the online medium, in this case the VLE and collaborative learning. The learners were facing challenges associated with these innovations. The data indicated that, in several cases, the learners' attitudes towards the innovations were gradually changing and becoming positive. This trend is reported in the literature (Mitchell and Honore, 2006). The emerging issues in this section are hence, presented under two main categories: (1) Online learning and the usefulness of the VLE (Section 4.4.2.1) and (2) collaborative learning Section 4.4.2.2).

4.4.2.1. Online learning and the VLE – from perception to final engagement

Figure 4.7 presents data which is discussed in this section. It shows the number of respondents with a positive attitude or engaging with online learning and the VLE at different times during the course. There is a general increase in positive attitude or engagement with online learning and the VLE in Phase 1 (up to Week 7). The thirteen participants in the two Ad-Hoc group interviews were purposely selected; they were all students who at the time were not showing interest in online learning. Term 3 (OCL) in Figure 4.7 refers to the number of students who were engaged in the course in Term 3. As is shown in Part V, of this chapter, an active online learning community of 22 students was formed.

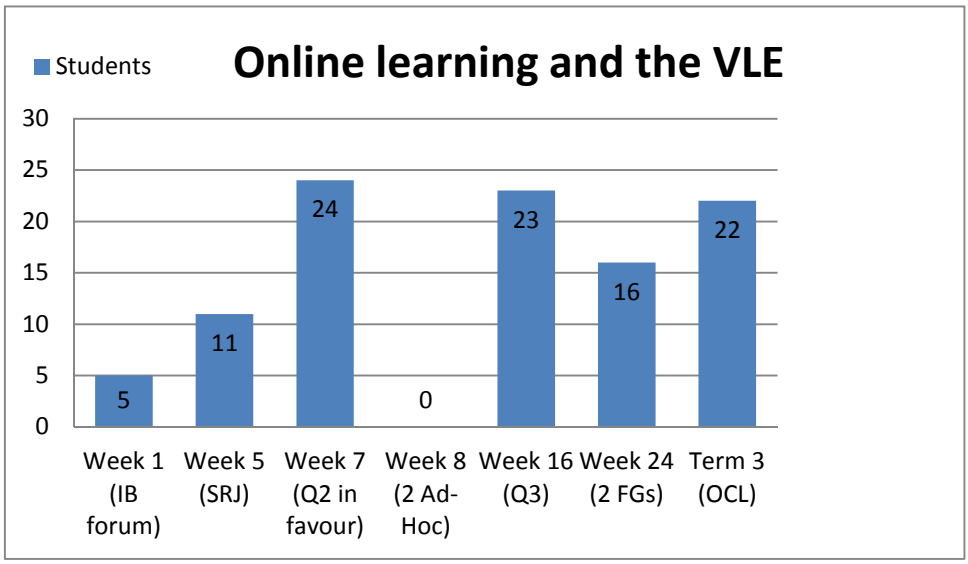

Figure 4.7. The number of learners engaging with online learning and the VLE *(IB: Ice Breaker; SRJ: students reflective journal; Q2: questionnaire 2; Q3: questionnaire 3; FGs: focus groups; OCL: online collaborative learning)*

a. Ice-breaker activity

As discussed in Section 4.2.2.1, only 5 students posted their first impressions of the VLE. These students considered the VLE as ideal and convenient for discussion (n=7), especially for shy students (n=1) and useful for students to get to know each other (n=4) (Section 4.2.2.2).

b. Students' reflective journal

In Week 5, 13 out of 17 students enjoyed the online learning activity and 11 students, recommended similar online activities. This shows that students were developing positive attitudes towards the use of the VLE for learning.

c. The early stages questionnaire (Q2)

Table 4.9. Integrating online learning with study

Use of the VLE in study routine	**Number of students**	**%**
Integrated Use of the VLE	24	65%
Poor or non-engagement	10	26%

Questionnaire 2 indicated that (questions 3-6; Appendix IV) in Week 7, 24 students (65%) integrated the use of the VLE in their study routines (Table

4.9). Three students visited the VLE every day, and spent around one hour in the VLE and the other 22 students visited the VLE for two or three hours every few days. The ten students (26%), who did not integrate online learning in their study routines, gave the following reasons:

- Time management problems due to extra-curricular commitments (4);
- The VLE is complicated to use (2);
- Internet used for recreation purposes not study (2);
- Lack of interest to use the VLE (2).

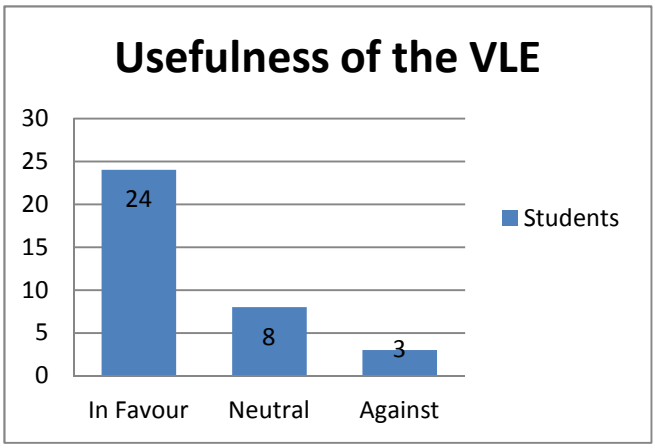

Figure 4.8 The students' response on the usefulness of the VLE

Questionnaire 2 (questions 8-10) revealed that 24 students (68%) were positive about the usefulness of the VLE for learning chemistry. Eight students (24%) were neutral, whereas three students (8%) were negative (Figure 4.8). The students provided the following positive comments (question 9) stating that the VLE was useful because it is a medium for:

- posting announcements (5);
- links to useful sites (6);
- discussion of difficulties in chemistry (13);
- collaborative learning (8);
- students to get to know each other (4);
- 'direct' contact with the teacher (2);
- easier communication between students (2);
- viewing PowerPoint presentations with voice over (6).

The following comment illustrates some of the positive points.

> *'Very useful especially when I have problems that are answered by anyone at their convenience in the fora. It's good to know each other and help each other out. I don't think anything is missing, really. It's both educational and fun, and well I can call it modern. It's a new way of learning and makes chemistry more fun, which is definitely a good thing.,' Anon, Questionnaire 2, Question 8, December, 2007.*

Nine students mentioned the following concerns (question 8) about their use of the VLE:

- the computer was in a noisy common area in the house (4);
- the computer was needed by other members in the family (5);
- a time limit for Internet use was imposed by parents (3);
- a time limit due to expensive dial-up connection (1);
- poor connectivity and an outdated computer system (1).

d. Two ad-hoc meetings

In Week 8, the two ad-hoc meetings with two purposely selected groups of students who were not participating in the VLE, threw more light on issues which affected the use of the VLE.

A group of four students, who were very quiet and passive in the face-to-face class, attended the first meeting. Two of these students were involved in community work and did not have time to use the VLE. The two other students expressed a dislike to computers and a fear of using them. These students preferred to use pen and paper. One of these students had an outdated computer and poor connectivity, and he said that accessing the chemistry content in the VLE was time-consuming.

The second meeting with a group of nine students revealed that three students were virtual world game players who claimed that they wanted to use the Internet only to play games. Two other students were moderate users of computers, but stated that they were not yet familiar with the VLE. The other four students considered online work as optional and unnecessary and were not interested in using the VLE. Three of these four students also had learning motivation problems in the face-to-face class.

During the meetings, all the students in the first group and the two students who were unfamiliar with the VLE indicated that they would make a greater effort to participate in the VLE.

e. The middle stages questionnaire (Q3)

Questionnaire 3 (Appendix VI) was given to the students in Week 16. It investigated the students' participation in two selected small group work activities (questions 1-17) and enquired about general participation in the VLE (questions 18-19). It indicated that twenty-three students considered themselves as active members in their small groups, and took part in both collaborative activities (questions 3-4).

Four students participated in one activity only and two students did not take part in any of the selected activities. These six students gave reasons which were mentioned in Q2 in Week 7 or in the ad-hoc meetings in Week 8, namely, Internet connectivity problems (3), lack of time (2), online work is optional and unnecessary (1) and unfamiliarity with using the VLE (1).

In questions 18-19, four students remarked that they had been using the VLE less frequently. Two of these intended to make an effort to use the VLE whereas the two other students stated that they were not so keen on using it. Three other respondents stated that their use of the VLE for learning had increased.

In question 19, some students added the following remarks to voice some persisting concerns:

- a preference for using pen and paper and present the work in the face-to-face classroom since inserting diagrams, and writing chemistry text in the wikis is tedious (3) and time consuming (5);
- limited time to use the VLE at home due to family members using the computer (4) and student busy schedules (3);
- a reluctance to use the computer for study due to a desire to use the computer for games and recreation only (5);
- non-familiarity with use of the VLE (1).

f. The two focus-group meetings:

The two Focus groups in Weeks 24 and 25, gave a deeper insight into the students' attitudes towards the use and usefulness of the VLE. The issues which are listed in Table 4.10 were discussed in the focus groups. These have already been mentioned in the previous discussions.

Table 4.10. Issues re-emerging in the focus group discussions

Issues regarding the use and usefulness of the VLE	**Number of students n=19**
Online work optional and unnecessary.	1
Many weeks required for familiarisation with the VLE	4
Unavailability of computer at home	3
Low connectivity and outdated computers with low processing power	1
Time-consuming and tedious to write in	3
Instrumental to get to know each other	majority

New issues which took prominence and were agreed upon by all the students during the two focus group meetings were:

- The VLE improved the communication between students in the face-to-face class;
- The VLE was ideal as a place where to ask questions, revise work, and check answers with model answers;
- When work was started in class, it was easier for the group to continue it in the VLE.

The majority agreed that the online presence and response of other students encouraged further participation. As also reported in the literature (Section 2.2.4.4), contrasting views regarding the use of the VLE emerged as students reacted to each others' comments. For example:

- Two students did not prefer to receive email copies of the VLE discussions, because, according to them, accumulated unopened emails discouraged them to access the VLE. On the other hand, eight students appreciated receiving the email copies as these kept

them updated regarding online activities. They used the emails as a quick link to access the VLE.

- Four participants argued that they prefer to do additional work on paper so that it can get marked immediately by the teacher. In contrast, eight participants and contributors pointed out that in the VLE, work is both marked and discussed by other students and the teacher;
- Three students considered online work as optional and unnecessary. On the other hand, the majority remarked that they would not have done so much work without the given online tasks.
- Four students visualised the teacher in the VLE and one student was persistent in addressing posts to the teacher; in contrast the majority visualised the whole class when they participated in the fora and visualised their group members when they used the wikis;

4.4.2.2 Collaborative Learning – from perception to final engagement

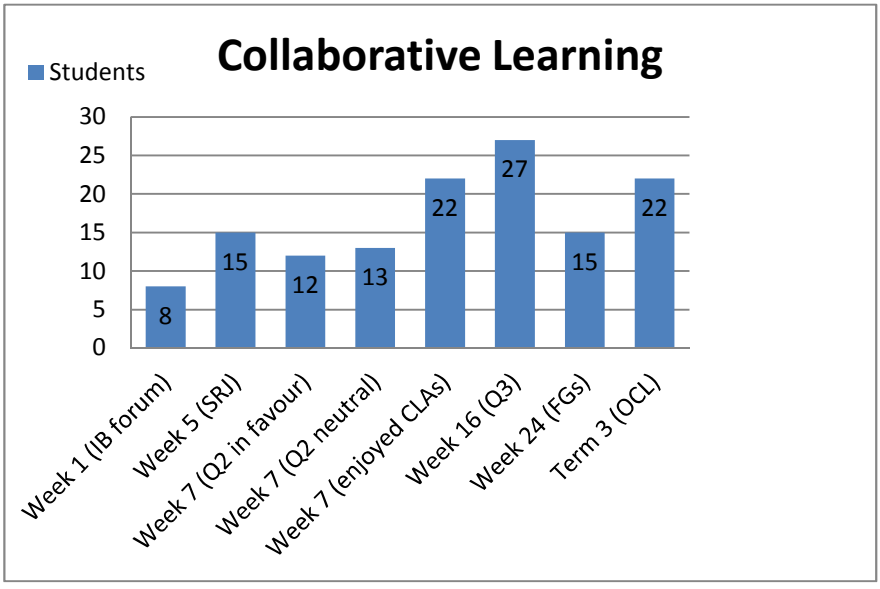

Figure 4.9. The number of learners engaging with collaborative learning *(IB: Ice Breaker; SRJ: students reflective journal; Q2: questionnaire 2; CL: Collaborative Learning activities; Q3: questionnaire 3; FGs: focus groups; OCL: online collaborative learning)*

Figure 4.9 reveals the learners' change in attitude towards collaborative learning during the course. In the Ice-breaker activity in Week 1 eight students, out of nine students who posted their views, expressed a positive attitude towards collaborative learning (Section 4.2.2). Data from the students' reflective journal, questionnaires, and interviews shows that as students experienced collaborative learning, they became more able to appreciate its value for learning. This is shown by a general increase in the number of students engaging with collaborative learning (Figure 4.9). As revealed in Part V of this chapter, 22 out of 37 students eventually formed an active online learning community.

a. The students' reflective journal

In Week 5, in the students' reflective journal, fifteen out of 17 respondents said that they were active members in small group work (question 3). These students also listed negative issues which arose due to the lack of activity of other members. These were:

- infrequent or no communication from group members (3);
- members post contributions at a very late stage (2);
- no contribution of work from some members (3).

Five contributing group members were infuriated that they had to chase other members to do the work, or wait for a long period of time for other members to post their work or to do the work which had to be done by other students in the group.

Some students raised issues of a personal nature, namely, three students claimed that they had a lack of confidence in the work presented by other students in both small groups and whole group fora. Two students were concerned that their own work and that of other students might lack examinable content. For these reasons, these five students preferred to work individually and asked for the teacher's prepared notes.

The twelve groups of students participating in the first collaborative activity were formed by the teacher. Responses to questions 4 and 5 indicated that 6 groups functioned well, 5 groups encountered some problems and one group

did not function well (Figure 4.10). In the group which did not function well, the work was performed and presented by one member of the group.

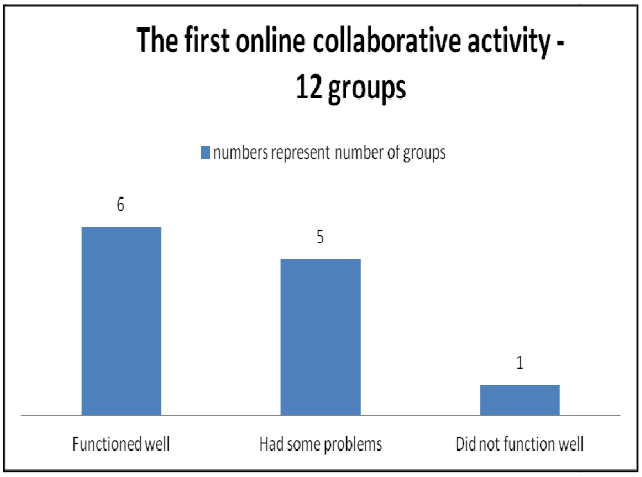

Figure 4.10 The performance of groups in the first collaborative task

In question 7, some students offered the following suggestions:

- groups to be student self-selected (8);
- the assigned work to be equally divided between the students by the teacher (1).

b. The early stages questionnaire (Q2)

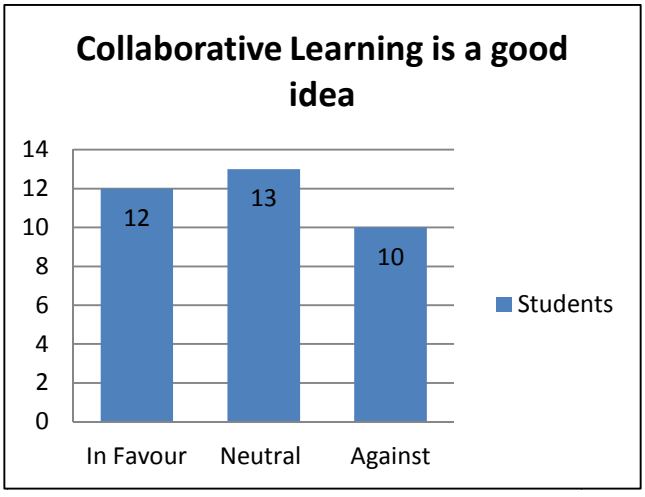

Figure 4.11 The students' response regarding collaborative learning

In Week 7, in this anonymous Questionnaire 2 (question 7; Appendix IV), twelve students indicated that learning chemistry through collaborative work was a good idea. Thirteen other students were neutral and ten students did not like collaborative work (Figure 4.11).

Yet, in question 10 of the same questionnaire, twenty-two students wrote that they enjoyed the collaborative activities. Seven students appreciated the way students helped each other solve problems in whole-class fora. Twelve students appreciated getting to know other students.

c. The two ad-hoc meetings

As discussed in Section 4.4.2.1, these students had problems with engaging with technology or with the VLE for study purposes. One of the students who had a fear of using computers, stated that he preferred to work on his own and not in a group.

d. The middle stages questionnaire (Q3):

In Week 16, this anonymous Questionnaire 3 (questions 6, 12, 15; Appendix VII) indicated that twenty- seven students valued collaborative work because it provided an opportunity to:

- foster a sense of commitment, responsibility, and support towards others (3);
- work with others (6);
- assess one's learning (2);
- learn how to collaborate with others (2);
- have the work done by different groups as a resource to all the class (14);
- learn by observing others solve problems (5)

Although in general, student-selected groups functioned better than the teacher-selected groups, some students were still concerned about the lack of commitment from members in their small groups (questions 7, 9). Ten students claimed that a student in their group did not contribute in the problem-solving activities in the wiki. Two other students indicated that two students in

their group did not access their wiki. The following comment reveals the frustration which was felt by one contributing member.

> *'I think it is unacceptable to have to struggle and try to convince other members to work. I felt miserable trying hard to convince someone to participate.,' Anon, Questionnaire 3, February, 2008.*

In question 16, twenty students highlighted the following concerns regarding collaboration in small groups.

- not all members are eager to contribute equally (8);
- chasing other members to participate is tedious (3);
- some members do their work at a late stage and keep other members waiting to finalise the task (2);
- regardless of the extent of the contribution, all members in same group obtain the same grade (3);
- discussing each others' work is time consuming (5);
- some groups present their work at a late stage and the work is not immediately available for study purposes (1);
- some members dominate the group (1).

The first five concerns echoed the ones stated in Weeks 1 and 5.

In question 5, eleven students stated that their group functioned well. In question 8, eighteen students said that each member in the group worked out most of the questions and then the group discussed all the work and chose the best sections. Seven students said that each member did part of the assignment and then the group discussed each part together. Three students said that the work was mostly done by one person, but then the other members reviewed the work and added details. Twenty-four students indicated that they used free lessons at the college to discuss their work (question 10). Eight students indicated that they used email for communication. Four students used the wiki only.

In question 5, seventeen students confirmed that they preferred student self-selected groups and maintained that in student self-selected groups, it would be easier:

- for members to meet online through social networks or at college to communicate and organise work (10) (in some cases, close friends would spend free time together at college or online (2));
- to approach non-contributing members of the group (3);
- to trust friends for collaboration;
- for students, especially shy students, to feel less cautious to discuss the work (5);
- for students to feel comfortable to agree, disagree, to resolve conflicts and edit each others' work (4).

Five students showed no preference for either teacher-selected or student self-selected groups, whereas two students preferred teacher-selected groups. These students showed a desire to work with different students and make new friends.

Twenty-four students (83%) said that they learnt from these activities (question 12 -14). All students except two read the wikis of other students. A student wrote:

> *'Were it not for these tasks in Moodle, I would not have practised so much and worked so many examples,' Anon, Questionnaire 3, February 2008.*

All students intended to use the chemistry content in the wikis for revision.

Some students suggested (question 17) that the teacher should:

- set group-work also in the face-to-face class (2);
- set more individual tasks and reduce the amount of group-work in the VLE (1);
- allow students to stay in student self-selected groups (3);
- allow students to work in diads (1);
- ask students to write about their individual contribution to the group (1);
- should divide the work equally amongst the students in the group (1).

The first two suggestions seem contradictory and most other comments seem to imply that students were encountering social problems with group-work. In fact, three students requested a mechanism which would ensure that all members of the group would contribute work.

In question 18, seven students only stated that they were keen to help, to share and discuss in whole-class discussions. Sixteen students said that they were active participants in small group-work but did not contribute in whole-class discussions. Two other students found it easy to post in the informal chat, but were reluctant to join in formal learning discussions in whole-class fora. The students, who indicated a negative response with respect to contributing to whole-class discussions (Question 19), gave the following reasons:

- a lack of confidence in the subject matter (10);
- shyness (4);
- having nothing to add to postings (5).

e. Two focus group meetings

In the two focus group meetings, in Weeks 23 and 24, the students reacted to each others' comments and in certain cases extreme variations in attitudes, characteristics and behaviours were apparent. Fourteen out of the nineteen students who participated in the focus group meetings, were engaged in collaborative learning. Eight students remained concerned about the non-contributing members in the small groups. Four of these students found it hard to ignore the non-contributors (n=4). These students felt that they were doing all the work while the other members showed no interest. Two of these students were so much disappointed with the non-contributing attitudes of members in their groups that they suggested that the work should be equally divided by the teacher for the group and any work which the members do not do, will remain undone. The two other students explained how, due to the presence of lurkers, their own enthusiasm had at one stage so dwindled, that they themselves had become reluctant to participate in the VLE. In contrast, six other students stated that they ignored non-contributing members in their groups. Three students who at the time were not using the VLE, remarked that

the accumulation of messages in the discussion fora and the accumulation of non-attempted tasks discouraged them to participate further in the VLE.

According to three students, self-confidence and self-discipline were necessary for students to help and share their knowledge with others. These students said that they felt they had gained the trust of other students in both their small group and in whole-class discussions and were always ready to engage in discussions and explanations. They did not fear to be challenged or corrected in the online discussions. On the other hand, four students said that in whole-class discussions, they feared that their contribution, the explanations which they would offer or the questions which they would ask, would make them appear less knowledgeable when compared to others in class. Thus they were reluctant to participate in problem-solving activities in whole-class discussions, but still read all the postings. In small group-work, this fear was less felt, especially when the members of the group were chosen by the students themselves. However, three students remarked that they found it difficult to edit other members' work, even in student self-selected small groups. Three students claimed that they felt shy to express their views in whole-class discussions, but they gave their full contribution in small group work.

Section 4.4.2.3 Summing up

Part IV has shown changes in some of the student attitudes and behaviours with respect to online learning, the use of the VLE and collaborative learning. The data generated by the research tools in Part IV shows a trend where the number of students valuing online collaborative learning increased in the first phase. The issues which were raised by the respondents were of a personal, a technological or a social nature. These are listed in Tables 4.12, 4.13 and 4.14, and show the frequency of students stating a particular issue. In a few cases the issue was of a dual nature, e.g., fear of using technology is both personal and technological. However, in such cases the issue is mentioned in one table only. The tables show the frequency in terms of the number of students and the instances when the issues emerged. Table 4.11 is a quick reference table showing the response rate of students in the mentioned data generating instruments.

Table 4.11. The response rate in the data generated methods.

	Student journal	**Q2**	**Ad-Hoc**	**Q3**	**Focus Groups**
Response rate (%)	46%	95%	100%	79%	95%
Number of students who responded	17 out of 37	35 out of 37	13 out of 13	29 out of 37	19 out of 20

Table 4.12. Personal Issues

Issues relating to the individual student	**Student journal**	**Q2**	**Ad-Hoc**	**Q3**	**Focus Groups**
Lack of confidence in work of others	3			1	
Fear of missing on examinable content	2				
Shyness				4	3
Fear of appearing non-knowledgeable					4
Lack of confidence in subject matter				10	8
Nothing to add to postings				5	
Lack of time to use the VLE		4	2	3	
Lack of interest to use the VLE		6	4	1	
Internet for recreation		1	3	5	
Preference for use of pen and pencil			1	2	
Preference for individual work			1		
Discouragement: accumulation of incomplete tasks					3
Keen to give support in whole-class discussion				7	
Assess their learning				2	
Learn through observation				5	14
Liked PowerPoint presentations					19
Self-confidence and self-discipline					3

As can be seen, some of the issues persisted and emerged at different points in time, e.g., students posted a comment in the students' reflective journal and this also appeared at a later stage as a response in Questionnaire 3. It seems that several issues emerged in the responses in the middle stages questionnaires and in the focus group meetings. This may be explained by the fact that by this time, there was an increase in the number of students who gained trust and hence showed a willingness to voice their concerns and likes.

Table 4.13. Technological Issues

Issues relating to use of Computers	Student journal	Q2	Ad-Hoc	Q3	Focus Groups
Unfamiliarity with VLE use	3	2	2	1	
VLE is tedious to use				3	3
VLE is time consuming				2	3
Fear of using technology			2		
Computer in noisy area at home		4			
Computer used frequently by other family members		5		4	2
Time limit on computer use (by parents)		3			
Time limit on Internet use (costly dial-up system)		1			
Outdated computer	1	1	1	3	
Low connectivity	1	1	1	3	2

Table 4.14. Social Issues

Issues relating to others in the group	Student journal	Q2	Ad-Hoc	Q3	Focus Groups
No communication with others in group	3			10	3
Post work at a late stage	2			2	
No contribution of work to group	3			8	few
Group conflicts re division of work				1	
Some members dominate the group				1	
Discussing each others' work is time consuming				5	
Uneasiness to edit work of others					3

This study gave the students the opportunity to reflect on their learning. Hence the students were able to mention positive aspects such as an ability to learn by observing others and to assess their own learning. In small group-work, the students seemed to be pre-occupied by the lack of contribution by some members in their group. In whole-class discussions, few students were willing to discuss and help others; some other students were shy and uncertain of themselves.

These issues required more investigation. The questionnaires gave a general understanding of the student experiences. The ad-hoc and focus group

meetings clarified issues and were instrumental for students to reflect on their experiences. In order to dig deeply into the students' online experiences, I conducted individual interviews. The data presented in Part IV triangulated the data from the interviews, which certainly provided a richer picture of the online experiences. The trends in Part IV indicate a general increase in positive attitude and participation, but then the number of students participating in the VLE remained more or less the same. Were the students participating in Phase 1, the same students participating in Phase 2 and Phase 3? Who were the students participating in the whole-class discussions and/or in small group work? The patterns of online behaviour (research question 1.1) in terms of online participation are discussed in Part V. These patterns, and the analysis of the data generated from the interviews (Chapter 5) indicated that twenty-two students eventually became engaged with online collaborative learning.

Part V

4.5 Identification of Online behaviour patterns

This part addresses the first research sub-question 1.1 and illustrates the experiences of the learners by revealing the different online behaviour patterns.

Online collaborative learning was an innovative mode of learning for all the students in the class (Section 4.4.2). Soffer, Nachmias and Ram (2010), and Rogers (2003) state that, individuals perceive innovations in different ways, and do not all adopt an innovation at the same time (Section 2.2.2). Furthermore, the literature confirmed that technical innovations cause changes which may be stressful (Akerlind and Trevitt, 1995) (Section 2.2.2). This study, even in the first phase, revealed detailed and complex online behaviours which are not easily explained by Rogers' (2003) innovation-adoption process. In the literature, student online behaviours have been likened to animal behaviours, e.g., dolphin (Salmon, 2002) or as group behaviours, e.g., swimmers, wavers and drowners (Salmon, 2000). The group behaviours revealed in this study were varied and complex and the set of descriptors which

were selected to describe them, needed to reflect this. These are presented in the next section.

4.5.1 The six online behaviour patterns

This study has identified six general online behaviour patterns, which resulted in six student behaviour groups. For easier reference (see Table 4.15), each of the six groups is likened to a term selected from music dynamics (musictheory.org).

Table 4.15 also gives the number and percentage of students with a particular type of behaviour pattern. The six behaviour types, which describe the online journeys of the students are discussed below.

Table 4.15. The online behaviour groups

Online Behaviour Group	Meaning of term	Number of students	The percentage of students	Behaviour Description
Marcato	emphatic	1	3%	Contributes fully
Moderato	moderate speed	9	24%	Contributes partly
Crescendo	becoming louder	12	32%	Increase in participation
Diminuendo	becoming softer	4	11%	Decrease in participation
Staccato	detached	7	19%	Episodic participation
Ritenuto	held back	4	11%	No participation

4.5.2 The online journeys

Figure 4.12 illustrates eight routes or patterns which gave rise to the formation of the six behaviour groups which are listed in Table 4.15. Each route indicates the students' online participatory behaviour during the eight month course. Route 1 shows the online behaviour of the Marcato student who participated fully in all activities, and interacted with the community, content and technology.

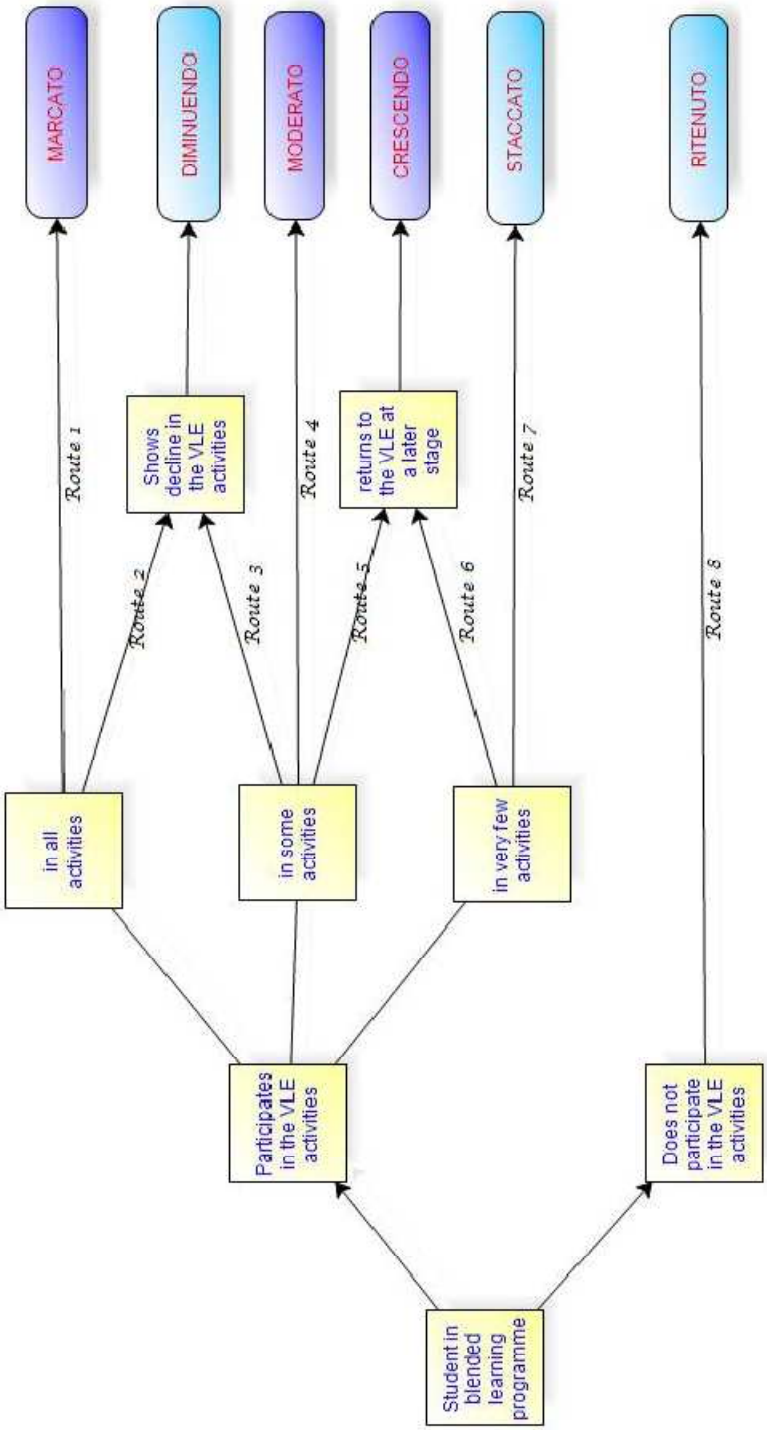

Figure 4.12. Online behaviour patterns

In contrast, route 8 represents the online behaviour of the Ritenuto students who did not participate in the VLE. Students following routes 2 and 3 showed a decline in online participation and are termed Diminuendo students. The Crescendo students followed routes 5 and 6. They showed an initial reluctance to use the VLE but eventually showed an increase in online activity. Route 4 learners, termed Moderato students, participated regularly in many activities, especially in small group online activities, but were read only participants (ROPs) in whole-class fora. Route 7 students, termed Staccato students, were infrequent participants, occasionally contributing to small group activities. Each behaviour group is described in more detail in the following sections.

4.5.2.1 The Marcato student

Marcato is defined as emphatic. It refers to a behaviour pattern of marked enthusiasm in learning. Marcato describes the online behaviour of one male student who was always keen to use the VLE, and to contribute in all online activities (Figure 4.12, Route 1). The Marcato student was enthusiastic about online learning from the very beginning.

> *'It was something new, like the lectures at the new College - another way to learn. I accepted it like it was a lesson, another resource,' Anthony, Marcato, in-depth interviews, May 2008.*

He believed that the VLE carried great potential to improve his learning. He sustained a deep interest throughout the whole programme, and was an example to his peers. The Marcato student learnt through acquisition, participation and contribution, and was exemplary in contributing learning material, relevant to his and other students' needs (Collis and Moonen, 2001; Sfard, 1998). The characteristics of the Marcato type of behaviour include self-directedness, autonomous learning and eagerness to share and discuss with others. The student was self-confident and was capable of assessing his own learning, researching, and giving timely feedback and support to other students (Bernard et al, 2004). The Marcato student showed leadership qualities in his group. Of his own free will, he visited the wikis and fora of other groups to discuss the work with them.

4.5.2.2 The Moderato students

The term Moderato is described as a tempo indication denoting moderate pace. Moderato (Figure 4.12, Route 4) describes the online behaviour of students who contributed well to small group activities and worked through individual tasks, but were read-only participants in whole-class collaborative activities. These nine students showed an interest in online learning and believed in its potential for learning.

> *'..I was learning from it. If I do not login for some days, I make it a point to login and see what is new. I always felt that I want to know what is going on, being a part of it…,'Kelly (Moderato), individual interviews, May 2008.*

The Moderato students constructed their understanding from whole-class activities, even though they were not contributing to it. They regularly accessed the VLE and made good use of the knowledge that was generated in it.

The Moderato students were frequent VLE participants and followed the activities in both the VLE and in the face-to-face class. They were responsible, supportive and hard-working collaborators in small group work.

4.5.2.3 The Crescendo students

Crescendo, which in music dynamics refers to a gradual increase in loudness, describes the online behaviour of students who in the first weeks of the online course, were either reluctant to make use of the VLE or made little use of it. They eventually changed their behaviour showing an increase in enthusiasm and in online participation (Figure 4.12, Routes 5 and 6)

The Route 5 students (n=8) had initially participated in some small group-work activities, and in individual work. Route 6 students (n=4) were hesitant and seemed reluctant to take part in any online activity in the first weeks.

> *'Doing chemistry using the computer was strange. You learn chemistry much more if you write it. I was considering it as a lot of extra work. I did not see it as a support,' Jodie, (Crescendo), in-depth interviews, May 2008.*

The Crescendo students proved to be an intriguing group, who demonstrated a big change in their learning behaviour. These twelve students were

interviewed in-depth (Section 3.12.6) and their behaviour was analysed to understand their initial reluctance to use the VLE and the change that brought an eagerness and increase in participation. Individual Crescendo students gradually became full contributors at different stages during the programme. This change in behaviour reflected a change in roles, in study patterns and in attitudes towards online and collaborative learning. Most of the data generated from these in-depth interviews addressed the research question 2.2 and is discussed in Part 2 of Chapter 5.

4.5.2.4 The Diminuendo students

Diminuendo is defined as gradually getting softer. Routes 2 and 3 in Figure 4.13 indicate the Diminuendo type of behaviour. Diminuendo describes the online behaviour of four students who were initially active in the VLE, but eventually showed a decline in their contribution and became infrequent read-only participants from the second or third term onwards. In the first term, one student contributed to all activities (Figure 4.12, Route 2) and seemed dedicated in hosting informal discussion threads and in contributing to whole-class problem solving activities as much as the Marcato student. This student tried to explain her absence from the VLE in the second and third terms.

> *'Lack of commitment on my part ..... I promised myself that I'll do work again in Moodle. It was useful and I had no reason to let go…… Internet, emails, Moodle… were part of my daily routine,' Francesca (Diminuendo), individual interviews May 2008.*

The other Diminuendo students (Route 3) initially participated and contributed in some online activities, e.g., small group-work and individual work but they eventually also showed a decline in their activities. The VLE tracking system showed that these students occasionally logged into the VLE to read and download content.

4.5.2.5 The Staccato students

Staccato refers to a detached style. In this context, Staccato describes the online behaviour of seven students whose interest in the VLE, seemed disconnected or detached and changed as the students worked on different tasks (Figure 4.12,

Route 7). These students accessed the VLE episodically and participated in few tasks. They were unreliable team members in small group-work. The individual interviews with these students revealed that these students possessed the 'need to know chemistry' factor, but they considered online learning as an unnecessary study resource. They relied on learning through traditional means such as textbooks, face-to-face lectures, teacher's notes and private tuition. Online learning did not become one of the main modes of study for the Staccato group. The factors that contributed to this lack of participation will be discussed in the next chapter.

The following comment reveals the perception of online collaborative learning of a Staccato student:

> *'yes and no; Moodle is useful because you'll find discussions on certain topics which help you understand better certain concepts. No, because generally I do not find time for Moodle and can find information in book and notes,' Marisabelle (Staccato), individual interview, May 2008.*

The above student had part time work, and attended private tuition. It could be argued that such students could make better use of online support learning; however, time constraints and resistance to use innovative methods prevented this. The Staccato students were infrequent participants.

4.5.2.6 The Ritenuto students

The term 'Ritenuto' is defined as held back. Ritenuto is used to describe the online behaviour of students who were disinterested and held back in using the VLE throughout the course (Figure 4.12, Route 8). These students showed a general lack of interest in both the online and in the face-to-face class.

> *'I forget to access Moodle when I am home,' Andy (Ritenuto), impromptu face-to-face chat, December 2007.*

Although attempts were made to encourage these students to participate in the VLE (Section 4.4.1c), they remained disinterested in online learning and even missed out on many face-to-face lectures. Two Ritenuto students had self-enrolled in the VLE, but visited the site on two occasions only. Two other Ritenuto students did not enroll in the VLE. Sometimes, the Ritenuto students participated in activities which were commenced in the face-to-face class, but

did not contribute any further in the online setting. Ritenuto students were also encouraged to log into the VLE from the college computer laboratories. They were offered hands-on help with familiarisation of the learning space, but they did not show any interest.

Individual interviews with the Ritenuto students confirmed that two of these students had registered into the college with intentions of completing the two year course, but within the first few weeks, their interests shifted to other non-academic activities. They never developed a curiosity to see what was happening in the VLE and never participated. As discussed in Section 1.1.3, students at the College have to attend a minimum number of lectures to receive a stipend (Buhagiar, 2005). In some cases, students attend a course for a period of time until they find employment or join a more suitable course in another institution. The Ritenuto students did not complete the two-year chemistry course at the college.

4.6 Conclusion

This chapter presented the class of students, by indicating their familiarisation with technology prior to starting the course, the extent of their participation and who they became during the course. The chapter primarily addressed the first research question: What were the experiences of students following an online collaborative program in a blended learning context? The data presented in Part IV was mostly derived as learners' voices describing the experiences of the students. It revealed the complexity of the students' online behaviours and some of the factors which influenced them. Online behaviour patterns, which corresponded to six online behaviour groups were presented in Part V. These behaviour patterns highlight the online journeys which were taken by the students and the six groups formed one of the frameworks for the discussions in Chapter 5, wherein I discuss the factors which contributed to the various types of online behaviours (research question 1.2) and the impact of the online experiences on the learners (research question 2).

Chapter 5: The Discussion

5.0 Introduction

This chapter consists of two parts and addresses both research question 1 and research question 2 (Table 5.1). Part 1 of this chapter primarily addresses the research sub-question 1.2, using data generated mainly from the individual short and in-depth interviews (Section 3.11.6). This data triangulates the data sets which were presented in Chapter 4.

Table 5.1. The research questions as addressed in Chapter 5

Research Questions		Discussion
1	What were the experiences of students following an online collaborative programme in a blended learning context?	(Ch 4) / Ch 5
1.1	What were the online behaviour patterns of the learners following a blended course?	Part 1
1.2	What factors influenced online behaviours in a blended learning context?	
2	What was the impact of these online experiences on the learners?	
2.1	How did online participation change the students as learners?	Part 1; Part 2
2.2	What was the impact of online learning on the learning identity of the learners in the online and the face-to-face class?	Part 2

In Chapter 4, I addressed the first research sub-question 1.1 and identified six online behavioural groups of students (Table 5.2), whose different and intriguing behaviours are further illuminated throughout this chapter. I presented the data which revealed the students' familiarity with technology and their perceptions of online and collaborative learning before they started the course (Section 4.2), the online tasks and the extent of online participation (Section 4.3) and the students' ongoing experiences of online collaborative learning as indicated from questionnaires, learners' reflective journal and group

meetings (Section 4.4). In brief, out of a class of 37 students, 6 rarely used computers (Figure 4.1), all students had email and Internet at home, and 29 were members of social networks (Figure 4.7).The data also showed that as the course progressed, more students seemed to become appreciative of online collaborative learning and some online behaviours were changing.

Table 5.2. Brief description of the behaviour groups

	Behaviour group	**Number of students**	**Description of behaviour with respect to online participation**
1	Marcato	1	Full contributor
2	Crescendo	12	Initially reluctant to participate, but eventually became full contributors
3	Moderato	9	Regular participants but did not contribute to whole-class activities
4	Diminuendo	4	Initially showed interest, but this eventually declined
5	Staccato	7	Episodic participants in the VLE
6	Ritenuto	4	Did not participate in the VLE

Research question 2 is addressed in both Part 1 and Part 2 of this chapter. The online experiences of one particular group of twelve learners, the Crescendo group, feature prominently in this chapter. This interesting group showed a change in behaviour from reluctance to use the VLE to becoming full online contributors. Part 2 presents my interpretation of the change in the learners' identity based on the research data, i.e., my observations and the learners' narrations and interpretations of their online experiences. In this final part of the chapter, I discuss (1) the transformation in the learner identities of the Crescendo students, and (2) the outcomes of the interactions of the new learner identities in both the online and in the face-to-face settings.

Part I: The factors affecting online participation

Part 1 consists of six main sections. Section 1 presents the three identified challenges for online participation. Section 2 introduces a framework for the discussion and analysis of three main categories of factors which affected online participation. Each of these three categories is analysed, evidenced and discussed in Section 3, Section 4 and Section 5, respectively. Section 6 concludes Part 1.

5.1 The challenges faced by novice online learners

Section 4.4 revealed that most students in this study dealt with two innovations: (1) online learning which involved the use of the computer, the Internet and the VLE and (2) collaborative learning. An overall analysis of the learners' voices indicated that the students faced three main sequential challenges (Figure 5.1) to become successful online learners.

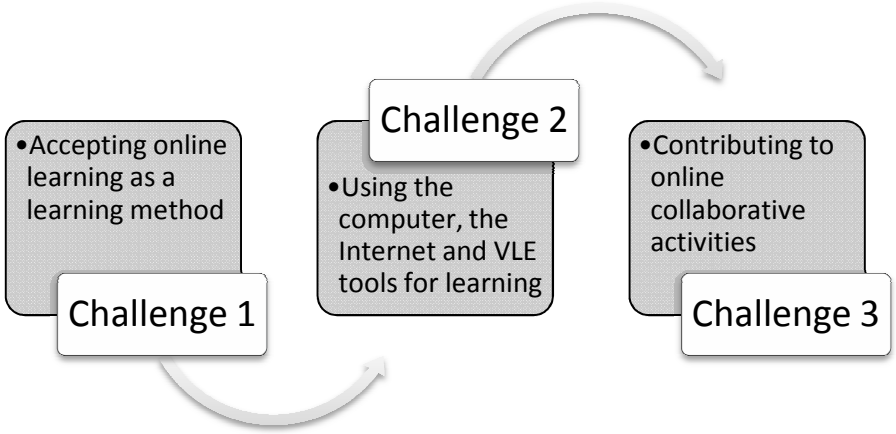

Figure 5.1. The three challenges for successful online learning

These challenges were met by the students at different stages during the online course and the factors that hindered or facilitated this process are shown in Figure 5.2. The first challenge which was conceptual, attitudinal and dispositional in nature, constituted the first stage in the journey for students to become online participants. The second challenge was psychomotor in nature and it involved using the computer, the Internet and the VLE tools for learning. The third challenge which was within the cognitive domain, involved the

contribution in collaborative activities in the VLE in terms of reflection, discussion and the generation of knowledge.

The Marcato student successfully met all three challenges, and quickly went through the five stages of Roger's innovation-adoption process (Rogers, 2003) (Section 2.2.2). He was in Roger's (2003) terms an innovator, who within a very short time, filled with enthusiasm, met all the three challenges. The findings in Chapter 4 showed that few students, in the first two weeks of the course, declared their positive impressions and positive attitudes about group-work and the use of the VLE (Section 4.3.2).

In their study, Mitchell and Honore (2006) had found that initial impressions and attitudes regarding the use of online learning affected online participation. Martinez (2003) remarked that engaging learners in the online medium is difficult, especially if the learners have been doing well in the face-to-face class over the time. The Crescendo students, for example, were not easily persuaded to take up the innovation. Nevertheless, they were resilient, and dealt with the obstacles that stood in their way. As Dweck (2007) argued, the challenges, for these students, were energising and offered opportunities for learning. The nine Moderato students did not fully meet the third challenge and were not full contributors in the VLE. The Diminuendo students met some challenges and stayed for some time, but due to various inhibiting factors, they did not remain in the online course.

The Staccato students episodically accessed the VLE mainly for general administrative communication purposes and occasional individual learning. These students did not meet challenge 3 and did not make full and appropriate use of the innovation. The Ritenuto students did not meet any of the challenges and did not go through the innovation-process stages.

The factors which enabled or hindered the students to take up the challenges and participate in the online activities are presented in a framework in the next section.

5.2 A framework for the discussion of inhibitors and enablers

NVivo was used to store, analyse and reduce the generated data to nodes and tree nodes (Section 3.14). This process helped me understand the data, and hence, the experiences of the students and the factors which inhibited or enabled them to participate in online learning. In Section 4.4, I categorised the data generated from the research methods in Phase 1, Phase 2 and the focus groups as: Personal, Social and Technical issues. Nevertheless, the individual interviews enriched the initial analysis and this necessitated a framework of different categories. In this chapter, I opted to discuss the factors which affected online behaviours or participation within a framework based on Garland's (1993) framework of inhibitors. The framework was composed of situational, institutional, dispositional and epistemological barriers (Section 2.2.3).

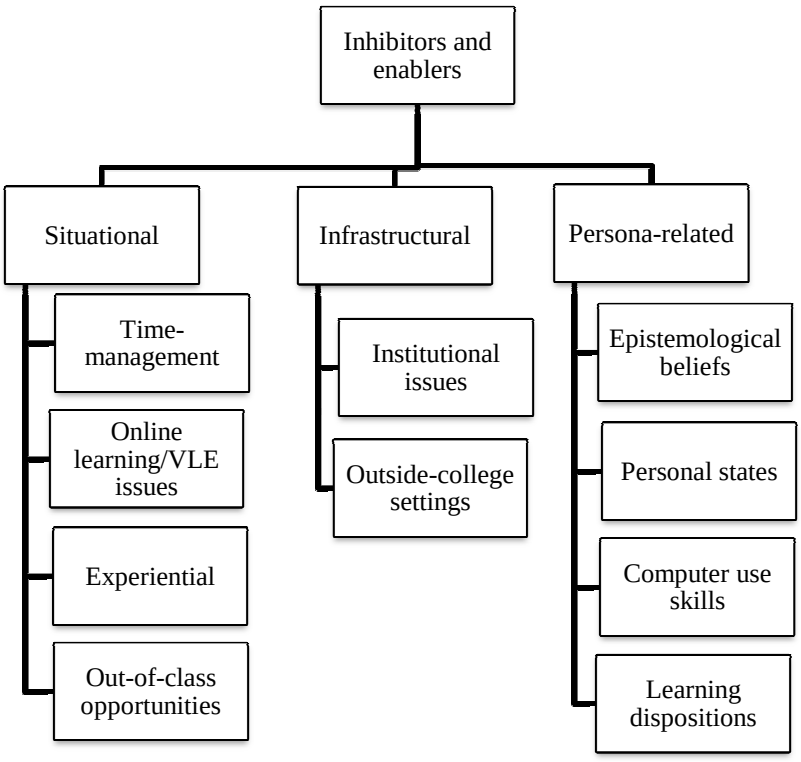

Figure 5.2. A framework of the factors affecting online participation

I extended this model to factors, both as inhibitors and enablers to suit my data. Infrastructural factors replaced the institutional barriers in the Garland (1993) model; this theme consists of factors which were of an infrastructural nature

arising from both the institution and home settings. I considered Garland's (1993) dispositional and epistemological factors under the persona-related theme. Thus, my model has three themes which are situational, infrastructural and persona-related factors, and each theme has categories (Figure 5.2).

Each of the categories is comprised of sub-categories, e.g., the learning dispositions category in the persona-related theme is further divided into resourcefulness, resilience, reciprocity and responsibility (Section 5.5.4).

This framework is used in conjunction with the three challenges and the six online behavioural groups (Figure 5.3) to address the research question 1.2 and 2.1 in Part 1 of this chapter.

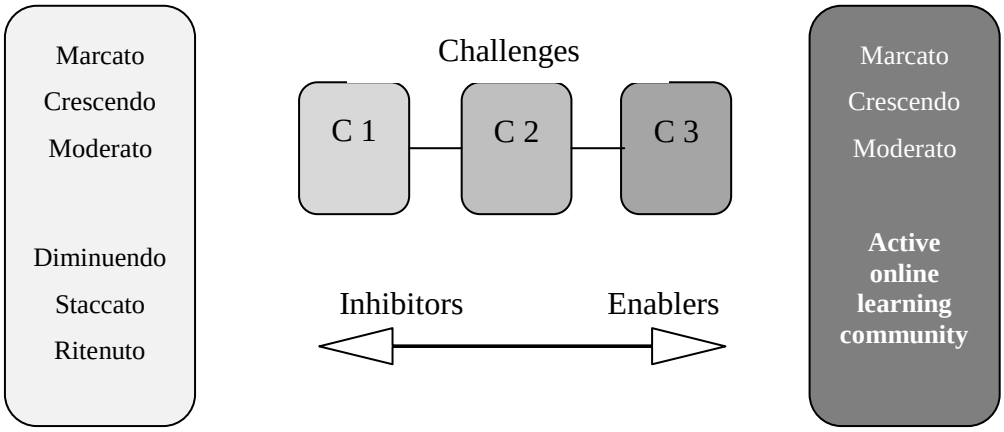

Figure 5.3. The relationship between the challenges (C1, C2, C3), the behaviour groups and the factors affecting online behaviours with respect to the formation of an active online learning community

Figure 5.3 represents the overall experiences. The student groups represented on the left faced the three challenges C1, C2, C3. The Marcato, Crescendo and Moderato students developed the online learning dispositions and were enabled to form the active online learning community. The Diminuendo, Staccato and Ritenuto students were affected by inhibitors and did not meet the challenges.

5.3. Theme 1: Situational Factors

Four categories of negative situational factors (Table 5.3) have been identified in the study. These categories, which comprise a total of ten issues, are time management, online learning related issues, experiential and out-of-class opportunities. These situational barriers to online participation arose due to the students' personal choices in their lives (Stanford-Bowers, 2008).

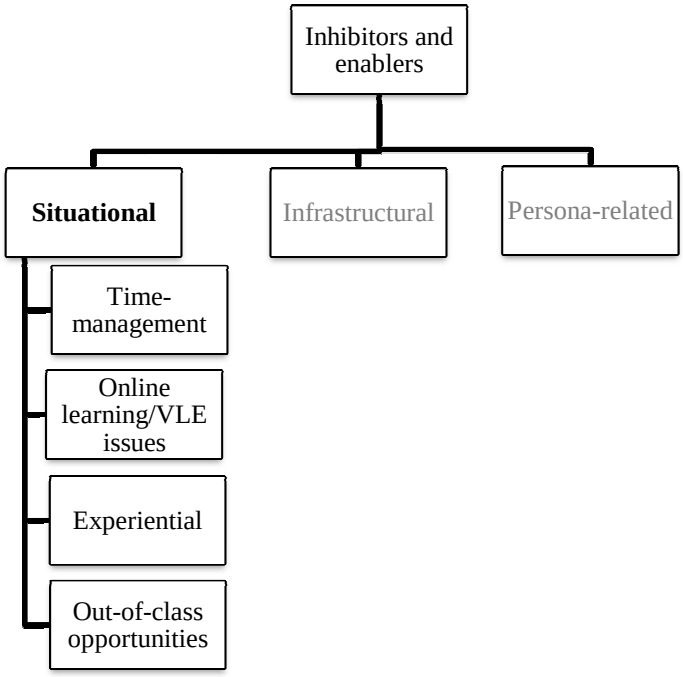

Figure 5.4. Theme 1: The situational factors

Situational barriers affected the seven Staccato, the four Diminuendo and the four Ritenuto students, and these did not accept online learning as a method for learning (Challenge 1). Five Crescendo students were also initially affected by situational barriers.

The barriers and the number of students (by group) which were affected by situational factors are listed in Table 5.3, and discussed in the following sections. In some cases, a student was affected by more than one situational factor.

Table 5.3 Frequency of situational barriers by group

Case	Factor	Behaviour Group	Number of students
1	**Time Management issues**		
	Part-time employment and	Staccato	2
	Social work	Staccato	2
	Extra-curricular activities	Diminuendo	1
	Personal reasons	Crescendo	2
2	**Online learning related issues**		
	Online work considered as unnecessary	Staccato	2
		Diminuendo	2
		Ritenuto	1
	Online work considered as optional	Crescendo	2
		Staccato	2
	Internet use for leisure	Crescendo	3
		Staccato	4
		Ritenuto	1
	Unexpected interface of the VLE	Crescendo	3
		Staccato	4
3	**Experiential issues**		
	Experience of collaborative work	Crescendo	2
4	**Out-of-class opportunities**		
	Loss of interest in learning chemistry	Ritenuto	2
		Diminuendo	2

5.3.1 Time management

5.3.1.1 Part-time employment and social commitments

Although the promise of e-learning technology is learning anywhere and anytime (Section 2.1.2.4), online learning became problematic for students committed to outside-college activities. The four Staccato students were not able to participate regularly in the VLE, because part-time employment or commitment in community work and sports occupied most of their time when they were not at College. These students who made up the small percentage of students not familiar with technology (Section 4.2.1), claimed that they rarely had time to use the computer.

> *'I spend a lot of time helping at the children's centre. I rarely use the computer. When I do, it has to be early in the morning, at around 3 am,' Jake (Staccato) ad-hoc group meeting, January2007.*

This implied that students who had little time to dedicate to study, found it difficult to accept online learning as a study resource (Challenge 1). They could not find the time to familiarise themselves with online tools (Challenge 2) and to contribute in the VLE (Challenge 3). These students were infrequent users of the online medium, and resorted to traditional methods of learning only, in the little time which they made available for study. The following comment was the only one ever posted by this Staccato student, who did part-time work and who participated in only one of the small group wiki tasks.

> *'So, I finally managed to find some time to try and work through the task. Thanks for the hints Miss, they were very helpful. I hope I have done some good work, at least ☺!!!,' Martha (Staccato), Atomic Structure 2 Forum, 15th January 2008.*

The Staccato students who had part-time employment said in the interviews that they used the VLE mostly to read teacher administration announcements.

5.3.1.2 Extra-curricular activities

For one Diminuendo student, taking part in the College concert in the second term, negatively affected her online participation. In the first term, this student, hosted informal chat threads and actively participated in chemistry content discussions. Her online contribution in the second term stopped abruptly and was not resumed when the concert activities were over. Unread and incomplete tasks accumulated in the VLE and these discouraged further online participation.

> *'…I kept on telling myself and my friends that I'll go in Moodle again.....But going in and seeing lots of work which I had never read scared me,' Francesca (Diminuendo), individual interviews, May 2008.*

Despite the fact that the student had met all three challenges in the first term, accumulated uncompleted work discouraged further participation.

5.3.1.3 Personal reasons

A Crescendo student was away from the College for the first four weeks of the online course due to health reasons, and was unable to access the VLE during this period. Due to her long absence from class and a fear of using computers (Section 5.8.2), this student was reluctant to use the VLE on her return to class and was considering resigning from the College. Another Crescendo student had family problems and during some weeks in the second term, she could not find the time to use the VLE (Section 5.5.4.2.2.v).

5.3.2 Online learning related issues

5.3.2.1 Online work considered as unnecessary

One Ritenuto, two Staccato and two Diminuendo students considered online work as additional and unnecessary work. Mason and Weller (2000), Martinez (2007) and Sweeney, O'Donoghue and Whitehead (2004) noted similar situations. The Diminuendo students were initially curious about the VLE, but after some weeks, they decided that they did not need additional resources for study.

> *'I am doing well with lessons from College and private lessons. These lessons are enough,' Rosann (Diminuendo), individual interviews, May 2008.*

These students lacked the interest to use different modes of learning.

5.3.2.2 Online work considered as optional

Two Crescendo students and two Staccato students considered chemistry online work as optional work, which they would do, only if they felt like doing it.

> *'I had the wrong idea about this site; I used to consider it as work that I could do if I felt like it.,' Deon (Crescendo), in-depth interviews, May 2008.*

The Crescendo students, unlike the Marcato student, took a relatively long time to meet the three challenges, but eventually, on realising that online work was

beneficial to improve their learning, they participated in the online activities (Section 5.5.4.2.1).

5.3.2.3 Internet use for leisure

Three Crescendo, four Staccato and one Ritenuto student associated the Internet with leisure and fun. The Internet for study purposes, for these students, was unthinkable.

Two of the Staccato students were virtual world game enthusiasts and claimed that they found the VLE unattractive. Further discussions revealed that these students played games till the early hours in the morning and spared no time for online learning.

> *'I never switch off the Internet... I do RuneScape... I sleep at around 3.30 in the morning. Moodle is too linear, bothersome and unattractive to stay in.,' Ramon (Staccato), individual interview May 2008.*

Ramon fluttered his fingers to and fro, mimicking his actions in online games, as he compared the VLE to other sites.

The following transcript of an interview with a Crescendo student reveals a typical mindset of students who did not want to use the Internet or computers for study purposes.

> *Celine: In the beginning it was like 'uff, xi dwejjaq' (uhh, how dull)*
>
> *Sharon: Dwejjaq (dull) why?*
>
> *Celine: I do not know, I am used to use my computer more for fun, after a day's work, to relax like, not to do homework sort of, but....'*
>
> *Celine (Crescendo), in-depth interview, May 2008.*

The Crescendo students who desired the 'Internet for leisure' did not readily accept the VLE as a learning resource. The Staccato and Ritenuto students resisted the integration of online learning in their Internet routines. Other studies, reported similar resistances (Section 2.2.1).

5.3.2.4 Unexpected interface in the VLE

Hirumi (2006) and Metros and Hedberg (2002) remarked on the importance of interface design to facilitate the use of the site by users. Despite the fact that the students in this class attended two face-to-face lectures with PowerPoint presentations about VLE access and navigation before they enrolled in the VLE (Section 3.11.2), three Crescendo and four Staccato students who were familiar with computers and the Internet referred to the VLE interface as 'strange' , 'odd', 'complicated', 'different' or 'unusual'.

> *'It was strange....complicated compared to other websites. Other sites are straight forward. This had part of it at the side, and in the centre with text everywhere. It was frustrating even to find groups and so on..,' Lois (Crescendo), in-depth interview May 2008.*

The above comment indicates the frustration of a Crescendo student as he tried to come to terms with navigation in the VLE. Another Crescendo student gave the following description:

> *'Moodle is a whole system. It was a hassle to find something. It was like you have a building: a corridor, etc. Sometimes, I forget in which room I have been,' Doreen (Crescendo), in-depth interview May 2008.*

5.3.3 Experiential issues

5.3.3.1 Past and ongoing collaborative experiences

Past and ongoing negative experiences of group-work affected the students' online participation. The interviews revealed that 60% of the class had no prior experiences of collaboration. Comments in the Ice Breaker activities showed that some students had some fears regarding collaborative practices (Section 4.2.2.1). Two Crescendo students lost their enthusiasm to participate, when members in their small group did not contribute in the wiki. The following comment reveals the disappointment and frustration of one of these students.

> *'Our group was a disaster, no one started any work. When I tried to do something I had no response. No one cared to see what I was doing. I ended up doing all the work by myself to hand it in time. 'Inhraqt' (literally means burnt up). I did not*

want to do any more Moodle', Lois (Crescendo), in-depth interviews, June 2008.

Similar experiences are discussed further in Section 5.5.1.2.

5.3.4 Out-of-class opportunities

5.3.4.1 Loss of interest in learning chemistry

Two Ritenuto students, who did not enrol in the VLE and two Diminuendo students who did not access the VLE after the first term, showed a lack of interest in learning chemistry. This was reflected both in their absence from the online medium, and also in their performance in the face-to-face class. They attended class but did not present assignments or sit for tests. The interviews revealed that they were waiting for an opportunity to attend another course in another institution. A factor which encourages this waiting practice is probably the financial incentive given to students who attend lectures at the College (Section 1.1.3).

5.3.5 Non-participant students

Negative situational factors affected mostly, the Ritenuto, Staccato Diminuendo and Crescendo groups. These students had difficulties meeting the first challenge, and except for the Crescendo students who were resilient, they rarely feature in the rest of the chapter.

5.4 Theme 2: Infrastructural factors

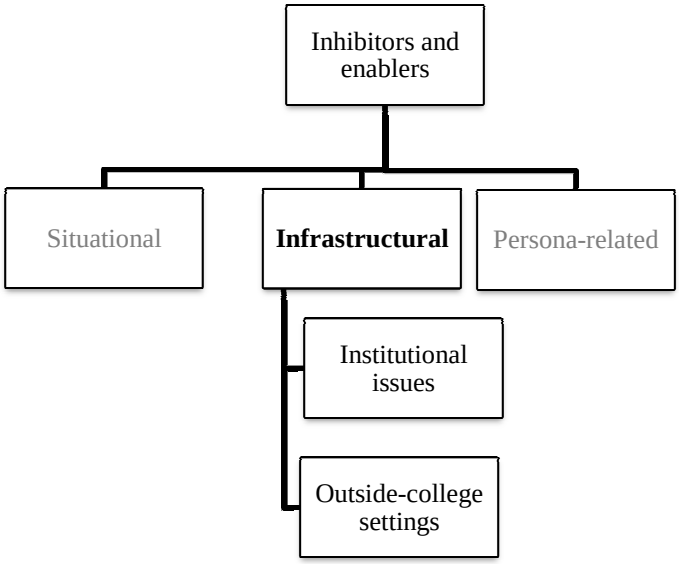

Figure 5.5. Theme 2: Infrastructural factors

In this section, I discuss the institutional and the home infrastructural limitations to the access of computers and the Internet. Table 5.4 lists the infrastructural factors which hindered online participation. In these cases, the students may have met the first challenge, but encountered problems with meeting the second challenge.

In 2008, the year when this research was carried out, 59% of Maltese households had Internet access (Section 1.2.2) and in contrast to previous years, all the students in the class stated in questionnaire 1 (Section 4.2.1) that they all had Internet access at home. Despite this, some students faced problems with computer or Internet use. These students were allowed to use the College laboratories computers. However, time constraints made this option problematic.

Table 5.4. Frequency of infrastructural inhibitory factors by group

Case	Factor	Behaviour group	Number of Students
1	**Institutional issues** Unavailability of technology	any student in any group who wanted to use the College labs	37
2	**Outside College settings**		
	Poor Connectivity	Crescendo	1
	Time restricted connections	Crescendo	2
	Computer failures	Crescendo	1
	Restriction in use of technology at home	Moderato	2
		Crescendo	2
		Staccato	2
	Non-ideal working spaces	Staccato	2

5.4.1 Institutional issues

5.4.1.1 Unavailability of technology and time schedules

Institutional infrastructural barriers are constraints to online learning which are beyond the control of the learner (Garland 1993; Stanford-Bowers, 2008). As computers and wireless local area networks (WLAN) were not available in the face-to-face classroom (Section 1.2.5), arrangements were made so that the students could use the computers and the Internet in the laboratories at the Information Technology (IT) department of the College. Nonetheless, the individual interviews revealed that students who needed to use the College computers, faced the following problems:

- Lack of time to visit the IT department due to a heavy lecture time-table;
- The computer laboratories were most of the time being used for IT lessons and in reality were rarely available.

Furthermore, if computers and Internet were available in the class, it would have been easier and quicker for some students to familiarise themselves with the VLE.

> *'It would have been easier if we had computers in class and you showed us how to use Moodle. I would not have found it so hard to use it,' Deon, (Crescendo), in-depth interview, May 2008.*

As other sections show, some students were not comfortable with using computers (Section 5.5.2.1) and were reluctant to use the VLE for online collaboration. Section 5.4.2 describes the infrastructural problems which the students faced with computer and Internet use outside the College.

5.4.2 Outside College settings

5.4.2.1 Poor Connectivity and outdated computers

Outdated computers with slow processing power and slow Internet connectivity, made it also difficult for some students to access the VLE content. For example, it was easier for Deon to read email copies of discussions in the VLE but, unfortunately, this did not allow active participation. The following comment indicates the frustration which was experienced by this student.

> *'I used to consider how best I could manage my study time. Was it worth attempting to use Moodle for my studies? It took me a long time to access the Moodle page and then even longer periods of time, to switch to another page. Work which should have taken me half an hour to finish, took me two hours or more,' Deon (Crescendo), in-depth interviews, May 2008.*

The waiting period required to access the VLE pages was detrimental to the learning process.

5.4.2.2 Time-restricted Internet connections, computer failures and unavailability of the Internet

Some students were at times faced with Internet connection problems and computer failures. A Crescendo student was unable to use the Internet frequently during the first term, due to time-outs on her Internet dial-up system. This system was also costly for her family. The student did most of the work offline, and was infrequently available for online collaboration.

> *'My time on the Internet was restricted. I did not get the chance to follow the current discussions. I read all the discussions at one*

point all at once. I really wanted to take part,' Janina (Crescendo), individual interviews, May 2008.

Another Crescendo student experienced computer failures at particular periods during the online course. During this period this student could not participate in the online environment. She handed hard copies of her work to the group.

5.4.2.3 Restricted use of the Internet and the computer at home

The computer and Internet at home, were not always available for use by the students. Two Staccato students stated that members of their family were most of the time using the only computer available at home for work or for relaxation purposes.

'My mother is a kindergarten assistant and in the evenings, she uses the computer to prepare charts for her class…. my mother, brother and myself argue over this computer use and many times we race each other to the computer chair,' Nathalie (Staccato) class individual interviews, May 2008

One Crescendo student had to share the only computer at home with her relatively large family. She used only the formal learning areas in the VLE (Section 4.3.3.1).

'I do not spend time in the Café area. There are five of us, brothers and sisters who need the computer, so I use it only for learning chemistry. I tell them I need the computer for some time on that day and that would be it,' Jodie (Crescendo), in-depth interview, May 2008.

Some parents, fearing that some Internet sites could be detrimental and that Internet use could become an addiction, imposed restrictions on its use. Three female students (1 Crescendo, 2 Moderato) remarked that at the beginning of the blended course, they were allowed to use the Internet only for short periods of time during the week. This problem was resolved when the parents were assured that their children needed to use the VLE for their studies.

5.4.2.4 Non- Ideal working spaces at home

Two Staccato students had computers in non-study areas, such as the family room or in a corridor.

> *'Our computer is in the TV room, where it is noisy. I cannot study there,' Karl (Staccato), final interview, May 2008.*

This situation gave rise to distractions and was not ideal for the students' reflective online participation.

5.4.3 Positive Infrastructural factors

The Marcato (n=1), six Moderato students (n= 9) and seven Crescendo students (n=12) were not affected by infrastructural factors. They had their own computers in their rooms at home and good Internet connectivity. They did not need to use the Internet at the College and thus they were not affected by the limited technological infrastructure at the College.

1.5 Theme 3: Persona-related factors

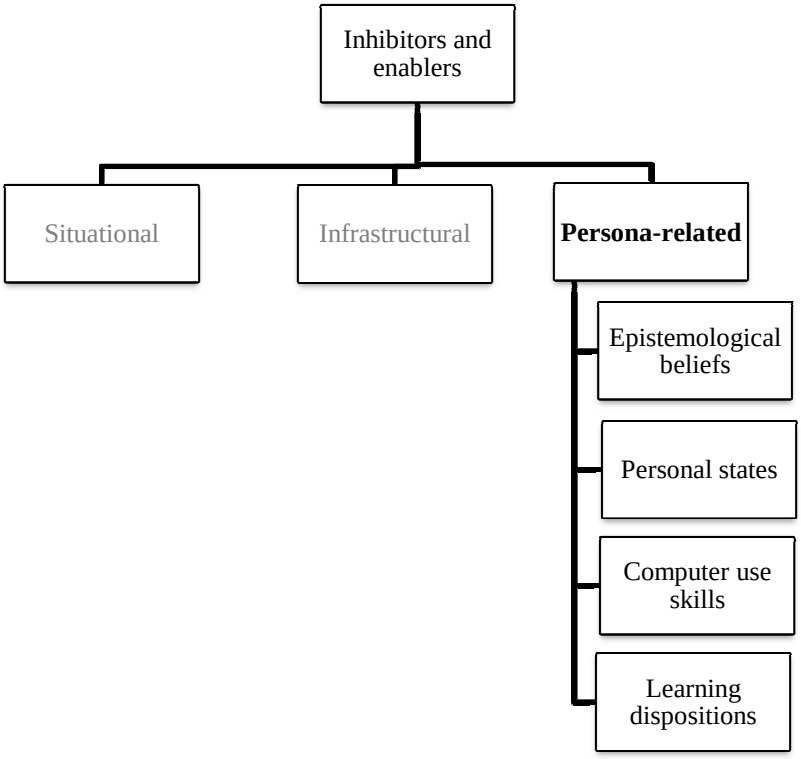

Figure 5.6 Theme 3. Persona-related factors

This section focuses on the persona-related factors which inhibited or enabled online participation. These factors are classified as epistemological beliefs, personal states, computer use skills and learning dispositions (Figure 5.6). Table 5.5 indicates the frequency of persona-related factors by group indicating the number of affected students. As previously stated, the seven Staccato, four Diminuendo and four Ritenuto students were not able to meet the first challenge. Thus, although in the focus group meetings and in the interviews, these students did express their beliefs and fears, this section focuses on the rest (n=22) of the class, i.e., the Marcato, Crescendo and Moderato students who eventually formed the online learning community.

Table 5.5 Frequency of persona-related factors by group

Case	Persona-related factors	Group	Number of students
1	**Epistemological beliefs (inhibitors)**		
	Learning occurs when knowledge is transferred from teacher to students	Crescendo	10
		Moderato	9
	Individual Learning is more effective and efficient than collaborative learning	Crescendo	6
		Moderato	5
2	**Personal states (inhibitors)**		
	Cyberphobia	Crescendo	5
	Lack of self-confidence	Crescendo	6
		Moderato	9
	Shyness	Crescendo	5
		Moderato	3
3	**Computer use skills (inhibitors)**		
	Reflection	Crescendo	5
	Writing chemistry	Crescendo	5
4	**Learning dispositions (enablers)**		
	Resourcefulness	Marcato	1
		Crescendo	12
		Moderato	9
	Resilience	Crescendo	12
	Reciprocity	Marcato	1
		Crescendo	12
		Moderato	9
	Responsibility	Marcato	1
		Crescendo	12
		Moderato	9

5.5.1 Epistemological beliefs

Data from questionnaires, focus group meetings and individual interviews revealed that several students started the online course with a particular understanding of how they 'acquired' their knowledge and how best 'to acquire' it. This understanding of acquiring knowledge, rather than constructing it, was firmly grounded on traditional methods of learning and did not support online collaborative practice, where students required skills for self-directed learning and were willing to co-construct knowledge (Panitz, 1997; Oliver and McCloughlin, 2001; Bernard et al, 2004; Section 2.2.1, 2.3.2.2). The data generated from the interviews confirmed that the two predominating epistemological beliefs were:

1. learning occurs when knowledge is transferred from the teacher to students (n=19);
2. collaborative learning is not as effective and efficient for learning (n=14).

These beliefs implied that a traditional classroom setting dominated by teacher-centred and individualistic learning was favoured by these students. This conflicted with socio-constructivist principles.

5.5.1.1 Belief 1: Learning occurs when knowledge is transferred from the teacher to the students

The data from the individual interviews showed that most students in this class held this epistemological belief (10 Crescendo; 9 Moderato). This belief conforms to learning practices which are teacher-centred and conflicts with a learner-centred approach which is crucial for online collaborative learning. The latter involves an active constructive process which is socially and intellectually involving (Smith and MacGregor, 1992).

The students who held the first belief were not able to meet Challenge 3, i.e., actively participate and contribute in the collaborative activities in the VLE.

In the interviews, the students gave evidence of this belief, when they expressed that:

- they learnt only through the teacher's explanation in the face-to-face class (n=17);
- they learnt when they studied from the teacher's set of notes (n=6);
- they expected the teacher to give them model answers and notes in the face-to-face class and in the VLE (n=3);
- they expected immediate responses from the teacher only in the VLE (n=5);
- they liked the online PowerPoint presentations (with voice) and short articles because they were prepared by the teacher (n=17);

The students showed a great reliance on the teacher for their learning. Similar views were implied in responses in the students' reflective journal, when students expressed a lack of confidence in the work of their peers (n=5) and a fear of missing out on examinable content (n=2) (Section 4.4.2.2.a). These issues were discussed in the literature (Section 2.2.4: Beekes, 2006; Sweeney, O'Donoghue and Whitehead, 2004). The following comments are a few of the examples which show the students' strong reliance on the teacher for explanations and notes.

> *'I do not understand much when I read the chemistry on the computer. I prefer the teacher's explanations in class,' Lisa, Moderato, individual interview, May 2008.*

> *'In Moodle there are students with different styles of expressing themselves. I am afraid I get confused. I would want to have one set of good notes from the teacher and use them to pass my exams,' Sylvia (Crescendo) in-depth individual interviews, May 2008.*

> *'The chemistry which other students write may not be correct …… I would not know. I prefer you give us notes on everything,' Anon, Questionnaire 3, February 2008.*

The first student indicated that she was not able to learn from computers, the second had problems learning from other students, and the third showed a lack of confidence in the work presented by other students. The following comment illustrates the effect of prior experiences of traditional learning:

> *'I preferred that you give us handouts in class, we do the work and you mark it. It will be like HW, then you give us the model answers and we calculate our grade ourselves. I am the type that if you do*

> *not collect and see my work, I do not make the effort to do it,' Paula (Crescendo), Focus group 1, 3rd April 2008*

The above Crescendo student relied on the teacher's authoritive approach to discipline herself to do the work (Section 4.4.2.1).

The following is a student's comment from a focus group meeting.

> *'I find tasks where I have to use the Internet or do research as monotonous, ... but the PowerPoint presentations with voice and the short documents, which you gave us were so useful,' Lisa (Moderato) Focus group meeting, April, 2008.*

It might be that PowerPoint presentations having auditory and visual features attract learners (Street, 2003; Harrison, 1998 cited in Gallagher and Reder, 2004, p.1); however, it could also be that listening to the PowerPoint and reading the short articles mimicked the one way traditional learning methods, where the student acquires knowledge (Mason and Hlynka, 1998; Turkle, 2003), and with which the students felt comfortable. In fact, Lisa's comment in the focus group was followed by a chorus of approval from the other members and a Staccato student added that the the PowerPoint presentation with voice was like listening to the teacher in the face-to-face class. In the individual interviews several students acknowledged the usefulness of the teacher's presentations in the VLE.

A traditional learning expectancy related to belief 1, surfaced when some students posted in the discussion fora. The focus group meetings revealed that some students (n=4) visualised the teacher as the only person of importance in the VLE. They and some other students (n=2) who visualised the whole class, expected the teacher to reply to their postings.

These students showed a reluctance to learn from their peers. This is indicated by instances where students persisted to address the teacher in their posts.

> *'Hi miss, I cannot work through numbers 5 to 8. How can I work out the molar mass in number 5?' Jodie (Crescendo), VLE, Amount of Substance forum, 13th March, 2008.*

This was done repetitively for a period of time by three Crescendo students, regardless of being discreetly reminded to address the whole group. A student

stated in the focus group meeting, that she would use the VLE if the teacher would answer her posting.

> *'I'll write in the forum if I know that you will reply to my question,' Janina (Crescendo) Focus group meeting 2, April 2008.*

On further clarification, the student said that she believed that only the teacher would understand her problems and be able to solve her difficulties. Anderson (2006) noted that students perceive interaction with their teachers as more valuable than with other learners. Similar behaviours are also documented by Crook (2002), Benson, Noesgaard and Drummond-Young (2001), Hammond, Trapp and Bennett (2002), and Beekes (2006) (Section 2.2.4.1). Also, as other researchers remarked, students tend to remain attached to traditional learning methods, when they access the online environment (Beasley and Smith, 2004; McConnell, 2000; Taylor, 2000). The belief that students can only learn from their teacher, for some time, affected the online participation of 10 Crescendo and nine Moderato students.

5.5.1.2 Belief 2 Collaborative Learning is not as effective and efficient for learning

At the beginning of the course, the students were informed that online learning would involve group-work and necessitate interactivity and argumentation. The interviews revealed that twenty-five students (68%) did not have an opportunity to work in a group in previous years. They were accustomed to traditional methods of learning which were dominated by individual learning rather than collaboration. Individual learning involved taking notes in the face-to-face class, studying from the teacher's handouts, the textbook, and doing individual work which includes problem-solving activities in class and at home. The data presented in Section 4.4 showed that some students gradually developed a positive attitude towards the use and usefulness of the VLE and collaborative learning. The focus groups revealed that in Weeks 23 and 24, some students were still concerned about the functioning of their groups (Section 4:Table 4.14).

In the first week of the course, a student who thought that group-work was fun, showed doubts about group-work:

> *'I don't really believe that chemistry is a subject made for group-work and presentations due to its level of difficulty,' Doreen (Crescendo), Café forum, Group-work thread, November 2007.*

Palloff and Pratt (2005) noted that some students offer a resistance to work in groups. Prior negative experiences influenced the perceptions of group-work for some students (Trigger and Prosser, 1991). Some students argued that collaborative work discouraged self-discipline as students rely on other members of the team to do the work; hard working members would have to do the work of others in the group or have to chase lurkers; some members post late and then there would not be time to present good work, and to add insult to injury, all the members of the group would also obtain the same grade. Such comments were repeated over and over again in questionnaires, meetings, and interviews (Section 4.4.2.2), e.g.,

> *'It could be that one person does not do his part and then the others have to do more than their share,' Marianne (Crescendo) in-depth interviews, May 2008.*

Some students believed that they would get higher scores if they presented individual work rather than group-work.

> *'I feared that there will be members in the group who would lower the grade. They do not do the work and it will be incomplete,' Sylvia (Crescendo) in-depth interviews, May 2008.*

Three Crescendo students believed that collaborative learning is not effective as members in the team would present conflicting ideas, and the group against individual wishes would have to settle for a compromise, knowing that better work and higher scores would have been obtained on an individual basis.

> *'I prefered to present my own work and get marks for my own effort. I feared that in the group I had to settle for some of the work which was not good enough,' Kate (Crescendo), in-depth interviews, May 2008.*

In addition, some students experienced discomfort in editing or reaching consensus in group-work.

> *'It was difficult to tell the others that their work was not good.' Janina (Crescendo), in-depth interviews, May 2008.*

Some students remarked that in group-work, the hard working members have to wait for the contribution of the other members. They remarked that it was tedious and time consuming to chase the irresponsible members of a group for their contribution.

> *'I sent a message to Larry. I told him - please do your part of this work. Clare and I did almost everything. We even spoke to him at school so that he'll do his bit.' Sarah (Moderato), individual interviews, May 2008.*

Furthermore, if this contribution did not materialize, the hard working members had to do the work in a short period of time. This would result in work of lower quality than if it is done individually from the start. Another student remarked that the fact that both hard-workers and lurkers obtain the same marks was irritating.

> *'....it does get a bit infuriating at times; some students do not work as hard as others and end up getting the same marks,' Carmen (Moderato), student's reflecting journal, November, 2008*

The above comments imply that the above students were convinced that collaborative learning was not as effective and efficient as individual learning. Several authors in the literature, e.g., Driscoll, 2004, Gilroy, 2001 have stressed on the effectiveness of collaborative learning (Section 2.1.2.4). Nonetheless, collaborative learning was an innovative experience and most students were not aware of its benefits. They needed to learn how to collaborate (Biott and Easen, 1994, McCormick, 2004) (Section 2.2.5.1) and become aware of its benefits (Tu and Corry, 2003).

5.5.2 Personal states

Individual interviews confirmed that a limited or a lack of online participation was also due to personal states of cyberphobia, shyness and a lack of self-confidence in contributing to whole-class discussions (Table 5.4).

5.5.2.1 Cyberphobia

Cyberphobia is 'an irrational fear of computers or technology' (Webster Dictionary, online). Questionnaire 1 revealed that six students (18%) in this class rarely used computers, and five of these claimed to be cyberphobic

(Section 4.2.1). Technical difficulties arising from unfamiliarity with tools pose barriers to learning (Ragoonaden and Bordelau, 2000; Ge, Yamashiro and Lee, 2000) and users become frustrated and confused (Juutinen and Saariluoma, 2010).

As the following comments indicate, cyberphobic students became concerned, when they were told about online learning.

> *'When you told us about Moodle, I was terrified because, in my case, the mention of the word 'computer' makes me think that I am in for something complicated and difficult,' Paula (Crescendo student), in-depth interviews, May 2008.*

Deon felt a psychological 'wall'. He could not work out how the VLE can be used as a medium for study and collaboration.

> *'When I got to the site, I felt there was a wall, a barrier, confusion. I did not know what to do,' Deon, Crescendo, in-depth interviews, May 2008.*

Another Crescendo student found the VLE complex to use and had thought that she was the only one who could not use the VLE. This student feared that she would inadvertently delete some sections in the VLE.

> *'I look at features and say: what is this for? What is this? I was reluctant to ask about difficulties as I was afraid I click on the wrong thing and delete important sections ……,' Marianne (Crescendo), in-depth interviews, May 2008.*

Rogers (2003, p257) referring to the complexity of an innovation as 'the degree to which an innovation is perceived as relatively difficult to understand and use', claimed that the complexity is negatively related to its rate of adoption. These Crescendo students were reluctant to use the VLE.

5.5.2.2 Lack of self-confidence to contribute to whole-class online discussions

Despite the use of ice breaker activities and informal discussions where the threads were started and populated by the learners themselves, the responses to the interviews confirmed the earlier comments in the questionnaires and showed that six Crescendo and all nine Moderato students exhibited a fear to

discuss chemistry topics in whole-class fora. The issues which inhibited these students were:

- a fear of asking banal questions, use illogical arguments and be considered as dim by other students (1Crescendo; 3 Moderato);
- a belief that their knowledge of chemistry was inadequate (3 Crescendo; 4 Moderato);
- a fear of being unable to express oneself in a comprehensible manner (4 Crescendo; 4 Moderato);

Some examples of comments include:

> *'I do not discuss in the large forum. I fear that the others will not understand what I say. Very often, I feel I do not know enough chemistry to discuss with them,' Janina (Crescendo), in-depth interview May 2008*

> *'I am afraid of writing incorrect things. A sort of insecurity, as I am not sure I say the right thing, and I say to myself who am I to explain things to others, a bit of lack of confidence. I am not used to explain to others,' Sarah (Moderato), individual interviews, May 2008.*

This lack of confidence in online discussions is reported in studies by Beekes, (2006), Ramsay, (2003), Sweeney, O'Donoghue and Whitehead (2004). The Moderato and the Crescendo students, who lacked self-confidence to discuss in whole-class discussion fora, eagerly contributed in informal discussions and in small group-work in the wikis.

5.5.2.3 Shyness

Cheek and Buss (1981) describe shyness as feelings of discomfort and inhibition in the presence of other people. They noted that shy persons exhibit different social online behaviours and not all shy individuals find the online environment a comfortable place. Five Crescendo and, three Moderato students considered themselves as shy students both in the face-to-face class and in the online setting. In the interviews, four self-declared shy students admitted that they were more comfortable in the online medium than in the face-to-face medium.

Cheek and Buss (1981) argue that shy students with a desire for social interaction fare better in online settings than in face-to-face settings. This was the case with one of the Crescendo students, who although very shy and passive in the face-to-face class, he hosted informal whole-class discussions in the VLE.

> *'I was never like this. I am usually very shy and reserved, but in Moodle I became a live wire (splodejt). I check into Moodle all the time, to see what is new,' Marcus (Crescendo), in-depth interviews, May 2008.*

The following comment from a Moderato student shows the inhibitory effect of shyness on participation in whole-class fora:

> *'There were times I felt I could help, but probably out of shyness, I did not. I am shy with new people. With my friends, I am ok…but with the whole-class, I could not bring myself to post a difficulty or help someone,' Sarah (Moderato) individual interviews, May 2008.*

In small group-work, most of these students were less shy.

Another shy Moderato student started the course with high hopes of having a voice in the VLE:

> *'Hey miss, this site is really good; it's a real help and looks fun lol! :p anyway i really like it ….it's a good way to get to know your class mates; especially those that are really shy and hardly say a word hehe!,' Adela, (Moderato) Forum on First Impressions of Moodle , The Café, Moodle Nov 2007.*

Unfortunately, in the second term, this student retreated to her usual introvert self.

> *'I am too embarrassed to take part. The questions they ask make me feel like I live in the moon because I don't understand them, so I feel useless because I cannot help them either. I am very shy. It is embarrassing. Only my close friends can understand me,' Adela (Moderato), interviews, May 2008.*

This student was able to overcome her shyness, only in the first weeks of the course. She posted in a whole-class forum where only four other students had posted. A possible explanation is that she felt more comfortable in the first weeks, when the students did not know each other, i.e., when relational identities in the class had not yet been established (Section 5.10.2.3).

5.5.3 Computer use skills

Some students were reluctant to use the VLE because they were not able to reflect on tasks when using the computer. Others found it difficult and tedious to use the keyboard.

5.5.3.1 Reflection skills

In Questionnaire 3, nine students remarked that they were reluctant to participate in online activities because they were not able to reflect on the given tasks and engage with their work when using the computer.

> *'…I cannot write and think properly when working on the computer. I have to leave, do the work on paper, and then go back and copy into the VLE,' Anon, Questionnaire 3, February 2008.*

In the interviews, five Crescendo students confirmed that they experienced this problem in the first weeks of the course. They explained that they first had to reflect on their task, jot down their thoughts and finalise their work on paper and then transfer the work to the VLE. This time consuming and tedious process contributed to a reluctance to use the online medium.

5.5.3.2 Writing chemistry text using the keyboard

In Questionnaire 3, six students remarked that chemistry text was not easily written using the keyboard since chemistry involves writing formulae and equations with many symbols, subscripts and superscripts. In the individual interviews, five Crescendo students confirmed that they appreciated online learning as a study resource, but they had found it difficult, tedious and time-consuming to write chemistry text in the VLE using the keyboard.

> *'.....to write Chemistry in Moodle took a lot of time. It was tedious,' Kate (Crescendo), in-depth Interview May 2008.*

This had made them infrequent participants in the VLE in the first term.

5.5.4 Learning Dispositions

Learning dispositions are described by Claxton and Carr (2002) as the readiness and the willingness to learn (Section 2.3). The data analysis in this study revealed four key learning dispositions: resourcefulness, resilience, reciprocity and responsibility. In this section, the four learning dispositions are discussed in relation to the learning journeys of the students, in particular of the Crescendo group, who were studied in greater depth than the other groups.

5.5.4.1 Learning Disposition of Resourcefulness

In the context of this study, the disposition of resourcefulness is the willingness to learn from alternative and additional resources and share the knowledge with others. It focuses on the cognitive aspects of learning. Claxton lists resourcefulness as a key disposition for learning. It features as one of the elements which expand the students' capacity of learning in the OFSTED reports in the UK (see for example Ofsted report: Ravenor Primary, 2012). The students who were resourceful in this class displayed elements of curiosity, confidence and flexibility. In this section, I highlight the evidence which shows that resourcefulness is an essential disposition for online learning.

5.5.4.1.1 Curiosity

The Webster dictionary (online) defines curiosity as a disposition to inquire, investigate, or seek after knowledge. Arnone (2003) describes curiosity as a heightened state of interest, which results in exploration. It is the motivational process for learning, implying that students need to be curious to learn (Carr 1995, Claxton 2006, Goleman 1996, Ainley and Armatas, 2006). In the first two weeks of the blended course, twenty-seven students (80%) had self-enrolled in the VLE (Section 4.3.2). Curiosity about the VLE and the new mode of learning was essential for students to access and use the VLE.

> *'I was curious. I visited Moodle everyday. I was an observer. I did not write much at the beginning, but I was enjoying what the others were saying,' Marcus (Crescendo), in-depth individual interviews, May 2008.*

In the case of the Marcato and Moderato students and later, the Crescendo students, the initial curiosity to access the VLE led to academic curiosity which was characterised by exploration, excitement, and interest to solve problems in the discussion fora and wikis. In this zone of curiosity (Day, 1982), the online participants became cognitively engaged in research and problem-solving activities.

> *'When I have a problem I would want to solve it ……. Anthony and I could not agree on an issue which we were discussing online. I was not sure myself, but I was not convinced of what he was saying. It took us some days, but finally we worked it out,' Kate (Crescendo), in-depth interviews, May 2008.*

Academic curiosity is essential for learners to fill the gap between what they do not know and what they must know to resolve their cognitive conflicts. Curiosity was also instrumental for some students, at least six Crescendo students, to observe other students solving chemistry problems. The Ritenuto, Staccato and eventually the Diminuendo students were below the optimal level of curiosity and lacked the motivation to explore resources, both in terms of research and also to learn with and from peers. The online behaviour of these students (Section 5.3.2.1) was characterised by avoidance, defensiveness, and disinterest (Arnone, 2003).

5.5.4.1.2 Confidence

The resourceful students in this course showed confidence in:

- the innovative learning setting;
- their abilities and their work;
- other students engaged in collaborative work.

The Marcato student expressed a confidence in the setting and was immediately enthusiastic to use it for learning, even though he did not know what it was like. As the next comment shows, he also had a confidence in the learning design, his ability to do research, understanding chemistry, explaining to other students and assessing his learning.

> *'Another way to learn. I accepted it like it was a lesson, another resource, I was looking forward to use Moodle. I see what*

> *problems other students have. I was not always able to solve problems, but I used to do some research, so that first I understand the concepts well and then I help the others; and I could tell how well I knew the topic myself,' Anthony (Marcato), individual interviews, May 2008.*

Resourceful students showed a mutual confidence in each other when they learnt together and from each other. This mutual confidence was also demonstrated in the small groups:

> *'We worked through the activities together. We divided the work between us during a free lesson at College or through msn. We checked and discussed each others' work in the wiki and put in comments until we agreed on everything,' Kelly, (Moderato) individual interviews, May 2008*

The students were aware that having confidence in each other was a crucial issue in collaborative work. In the first collaborative task, some students were disappointed with the presence of non-contributors in the groups, and requested to have student self-selected groups. They argued that teaming up with class-mates that one has confidence in, would be to the group's advantage (Section 4.4.2.2.d). They preferred to work in an environment where members of the team had confidence in each other (Iacono and Weisband, 1997).

> *'We work better together if we choose our own group; if you do not know something, they'll tell you how to do it; you do not get upset if they tell you are wrong. Someone who hardly knows you will not tell you that you are wrong; even I, do not like to tell someone I do not know well that I do not approve his work.' Anon, Questionnaire 2 December 2007.*

A Moderato student who was frustrated in a group which was not functioning, expressed her relief when she joined a new group of students whom she trusted:

> *'I was relieved to change the group for the second collaborative project. If you are not with enthusiastic people who come forward and say…let's do something…there will not be many contributions. I used to ask them to meet, I used to get frustrated because I could not force them,' Carmen (Moderato), interviews May 2009.*

Meyerson, Weick and Kramer (1996) have argued that swift trust operates in circumstances, when people do not have the time to get to know each other. Nevertheless, swift trust could not develop in groups which had non-contributing members.

5.5.4.1.3 Flexibility

Collis and Moonen (2001) refer to flexibility as learner choice in the learning experience such as course resources and types of activities which support learning. The online participants were flexible when they used alternative or additional methods of learning and they became resourceful, when they learnt from them. Additional learning resources were either suggested by the teacher or discovered by the students themselves.

The students who had considered online work as unnecessary (Section 5.3.2.1) or optional (Section 5.3.2.1) were not flexible. The following comments suggest that some students were not disposed to look at alternative learning resources. Deon considered using the VLE only when he was told that the work was part of the homework. Doreen was reluctant to become an active learner.

> *'..... but when you told us that this work was part of the homework, I thought of it differently,' Deon (Crescendo), in-depth interview May 2008.*

> *'I preferred to find the explanation already there – in the notes. I read it and understood it, Trying to solve problems and researching was tedious,' Doreen (Crescendo), Focus group 2, 4th April 2008.*

Students who did not grasp opportunities to further their learning and who relied solely on the teacher's notes were not flexible. Other cases where students preferred the teacher's notes and explanations were discussed in the Section 5.5.1.1. The Staccato, the Ritenuto and the Diminuendo students resisted the use of innovative methods of learning.

5.5.4.1.4 Conclusion

The learning disposition of resourcefulness is essential for traditional students to become self-directed (Section 2.2.5.1.iv) and collaborative learners. Students who were flexible and curious in their learning methods were able to accept and use online learning as a learning resource (Challenge 1 and Challenge 2). Being resourceful also entails sharing the learning with others by contributing to the collaborative activities (Challenge 3). This is further discussed in Section 5.5.4.3. The learning disposition of resourcefulness distinguished between the active and the passive students in the class. The former exhibited curiosity,

confidence and flexibility whereas the latter were satisfied to learn with what was readily available to them in the face-to-face class setting. In Section 5.5.4.5, I discuss how the disposition of resourcefulness was important for the Marcato, Moderato and Crescendo students to take on particular roles in the online learning community.

5.5.4.2 Learning Disposition of Resilience

The disposition of resilience is conceptually described by Claxton and Carr (2002) as an inclination to take on challenges when outcomes are uncertain, to persist despite temporary confusion or frustration, to recover from setbacks, and to rededicate oneself. It focuses on the emotional aspect of learning.

In this study, the disposition of resilience was exhibited by the students both at the macro level, in terms of using online learning as a learning method and also at the micro level, where online learners persisted to solve chemistry problems.

Although around 84% of the students (n=31) in the class stated that they were confident in using technology and online communication systems (Section 4.2.1.1), and 80% of the students (n=29) had enrolled in the VLE in the first two weeks, 60% of the students (n=22) formed the active online learning community. As discussed in Sections 4.4.2.3, 5.3, 5.4 and 5.5, several factors affected the students' online participation. The students in the class, except the one Marcato student, faced difficulties in meeting the three challenges. Nevertheless, the twelve Crescendo students had a disposition to be resilient and despite the inhibiting factors which may have caused frustrations and confusions (Juutinen and Saariluoma, 2010), they persisted and eventually met the online challenges. The Crescendo students are the main focus in this section.

5.5.4.2.1 The resilient learners

A disposition of resilience at the macro-level was shown by the twelve Crescendo students who demonstrated a pattern of change in their behaviour. These students and their online participation inhibitors are listed in Table 5.6. Despite uncertainties, frustrations, and beliefs, the Crescendo students became persuaded to participate in the VLE.

Table 5.6 The inhibiting factors affecting online participation for the Crescendo students

	Persona-related							**Situational**					**Infrastructural**		
	Epistemological		**Personal characteristics**			**Online Engagement skills**		**Online learning related issues**			**Experiential**	**Time Management**	**Outside College settings**		
	Belief 1	Belief 2	Shyness	Cyberphobia	Discussing	Reflect	Write	Internet for leisure	Optional work	Unexpected interface	Negative experience	Health Reasons	Poor connection	Time restriction	Restriction in use
Kate	✓	✓					✓								✓
Sylvia	✓	✓												✓	
Jodie	✓	✓	✓		✓	✓	✓								✓
Doreen	✓	✓		✓		✓	✓								
Paula	✓	✓		✓								✓			
Lois			✓		✓					✓	✓				
Marianne				✓	✓						✓				
Deon		✓		✓	✓				✓				✓	✓	
Marcus			✓		✓										
Janina			✓		✓									✓	
Naomi							✓	✓		✓					
Celine			✓				✓	✓							
Total	5	6	5	4	6	2	5	2	1	2		1	1	3	2

In the first weeks of the course, six Crescendo students welcomed the innovation.

> *'I think it is wonderful not only to discuss chemistry problems but also to get to know each other well, especially since at JC we don't have that much time to get to know everyone in class and fortunately enough some people find it easier to communicate and make friends with other people via the Internet,' Doreen (Crescendo), My First Impressions, Cafe Forum, October 2007.*

Nonetheless, the behaviour of these six students changed and their interest declined as they encountered problems and entered states of frustration and confusion regarding online participation.

> *'I was becoming frustrated after the first three weeks. I was worried how I would cope. I felt I could not use the computer for chemistry anymore,' Doreen (Crescendo), in-depth interviews, May 2008*

Six other Crescendo students were reluctant to use the VLE for study purposes from the very first week (Section 5.5.4.2.2).

The individual interviews revealed the several factors (Table 5.6) affecting these learners. The most common inhibitors were:

- the epistemological beliefs concerning a teacher-reliant and an individualistic learning approach (n=6);
- personal states of shyness and lack of self-confidence in using computers and contributing to the whole-class discussions (n=9);
- online engagement skills regarding writing and reflecting (n=7).

The next section portrays the journeys of six selected Crescendo students, and describes their change in behaviour. These learners are examples of students demonstrating the learning disposition of resilience. In each case the student encountered problems and for some time did not participate in the VLE; however, being resilient, the student persisted and was eventually persuaded to participate.

5.5.4.2.2 The journey of six Crescendo students

Table 5.7 The inhibiting factors affecting six Crescendo students

Student		Challenge	Inhibitors	Persuasion reason and time for change
1	Kate	1 2 2	Uncertainty issues - VLE for learning and collaborative work Writing chemistry and mathematical text in the VLE Restricted use of Internet at home	with past fruitful experience 4 weeks
2	Jodie	1 2 2 3 2 3	Uncertainty issues - VLE for learning Writing chemistry and mathematical text in the VLE Reflecting and writing using the keyboard Lack of self-confidence – discussing and posting Restricted use of computer at home Shyness	Realised that online learning met her learning needs 2 months
3	Deon	1 2 2 3	Online learning considered optional Poor Internet connectivity issues Lack of self-confidence in using computers Confused with group-work	Realised that online work was not optional 2 months
4	Naomi	1 2 2	Uncertainty issues - VLE for learning Internet for leisure Unexpected interface of Moodle	Mastering of topics involving mathematical calculations 2 months
5	Marianne	2 3 1	Lack of self-confidence in using computers Lack of self-confidence – discussing and posting Personal reasons (family problems)	Felt falling behind in chemistry 3 months
6	Lois	1 2 3	Unexpected interface of Moodle Negative experience with small group-work Shyness	Needed help with chemistry 3 months

Table 5.7 lists the six students and sixteen different inhibitors, which have been discussed in previous sections of this chapter. It also shows the challenges which each student had to overcome and the different period of time taken for each student to become persuaded to participate in the VLE.

Unless, otherwise stated, the quotations in this section are the Crescendo students' voices as expressed in the in-depth interviews (May 2008).

i. Kate

> *'At the beginning of the course, I used to prefer to work on my own. I wanted to give in my own work, and be awarded marks for my efforts', Kate.*

In the first weeks, Kate was convinced that online learning was a non-rewarding exercise. She was averse to collaborative learning and preferred to work on her own. Her first collaborative experience in the VLE was a negative one; the other members in her group were not enthusiastic about online learning.

> *'They gave me a hard time; they accessed the wiki at a late stage and had not done any work; I felt I was doing a lot of work for nothing. I was on my own,' Kate.*

She had insisted to give in her personal work and be awarded marks for her efforts. Kate claimed that she hated to use computers for study work and found writing chemistry text in the VLE tedious. She preferred to use pen and paper.

> *'I find it very tedious to write chemistry text in the VLE. I hate to use computers for study, I am getting depressed, thinking that when I get home I have to use the computer for chemistry,' Kate, unsolicited chat after class, November, 2007.*

In spite of her concerns about online learning, the student had the disposition to be resilient. Rogers (2003) states that

> the innovation-decision process is essentially an information-seeking and information-processing activity in which an individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation. (Rogers, 2003 p169)

In Week 4, Kate insisted on discussing the issue, after one of the face-to-face sessions. Kate's uncertainty had conflicted with her confidence in the teacher and the learning design. She went through the information-seeking process:

> *'I was trying to understand how Moodle can be used for learning. Now it is ok, I have understood how it works. I did not want to ignore what you were telling us about Moodle. I wanted to know*

and to see how it can be beneficial. I knew deep down that since it was there for us, it had a good use,' Kate.

Eventually, Kate became aware of the potential benefits of online collaborative learning and participated in the next whole-class discussion. She positively associated the innovative online tasks with rewarding work which she had previously experienced in another school.

'The task about Ionisation Energies was my turning point. Last year in Form 5, I was in Miss Terry's class. At the time, I was dropping out of the chemistry course, but after seeking the teacher's advice, I started doing the work. I wanted to do the same here. I saw the Moodle experience in the same light,' Kate.

This was Kate's persuasion point, reached after the first four weeks. Once she was convinced about the learning value of the VLE, she instantly took it up.

'You started giving us problem-solving tasks. I started working through them. Then when you said something in class, I could follow. I could easily work through the questions from the past papers which you were giving us,. I was feeling more confident with attempting past paper questions,' Kate.

She also became more engaged with the chemistry content in the face-to-face class. She became so confident in chemistry, that she could help the other students.

'When you were giving us problems on gases to work in class, I felt more confident. My class-mates, were asking me to help them with solving these problems. I had learnt to solve them well through Moodle,' Kate.

Kate became an avid contributor in the VLE. Like the Marcato student, she took on the role of a knowledge-mediator in both whole-class and small group discussions. She enhanced her learning while helping others to learn.

'When replying to a post, I do some research and try to find an answer; sometimes I get it wrong. I do not mind as long as I learn; I discuss with other students in the forum; sometimes we also send sms and then continue the discussion at College the next day,' Kate.

At the beginning, Kate spelled out her constraints about online learning. She did not like to use the VLE and was against collaborative work. Nonetheless, she was resilient. The student evaluated the situation thoroughly and becoming convinced of the value of online collaborative learning, she recovered from her

confused stage and rededicated herself becoming one of the most active contributors in the VLE.

ii. Jodie

> *'I considered Moodle as extra work, which I did not like to do. It was an unusual way to study chemistry. Doing chemistry using computers is strange,' Jodie.*

Jodie was considering the use of the VLE as an extra burden. She harboured the idea that chemistry is only learnt by using pen and paper. She was not comfortable using the keyboard to write chemistry text, and she could not think and reflect when facing a computer. In addition, being in a large family, she could not use the computer for a long time (Section 5.4.2.3).

Jodie had a low constuct of self-confidence and self-esteem; she did not ask and did not contribute to discussions. She feared she was not able to express herself and kept quiet.

> *'I did't find it easy to ask questions. I was afraid I ask something which was stupid. I had a fear that what I said did not make any sense,' Jodie.*

However in spite of her fears, Jodie felt somewhat that online learning could be useful. She trusted that using the VLE might improve her learning.

> *'I persisted to see how Moodle could be useful. I attempted to do some work to see whether I can learn through Moodle,' Jodie.*

Her attempts gave her positive results. This was her turning point. Jodie realised online learning was useful and made it her way of study.

> *'As I used Moodle I worked out more mathematical examples. I had the opportunity to try and solve difficulties on my own. Through Moodle I learnt to look up things, ask and discuss as I worked along,' Jodie.*

She appreciated the amount of student work which was being generated by the students themselves in the VLE to support their learning. She was pleased to own the work.

> *'……..there is work which we ourselves did; so much work; you can see it all there,' Jodie.*

She saw learning becoming an active process, with students communicating their knowledge and involving themselves in a volley of ideas. Jodie's progress was initially inhibited by several factors. After two months, she reached the persuasion point; she realised that the online work was relevant to her learning needs. Her discomfort of using the computer for study was no longer important. She made the effort and successfully used the VLE.

iii. Deon

> *'I had preferred using classroom notes and my book at home. I considered Moodle as optional work. Although useful, never gave it priority; I used to do other work and then maybe do Moodle…,' Deon.*

Deon was teacher-reliant and considered the face-to-face didactic learning more profitable than online learning. He preferred learning through listening to lectures, doing individual work, and referring to the teacher's notes and text book. Deon was one of the four quiet and passive students who attended the first ad-hoc group meeting. He had no experience of collaborative work, and felt confused.

> *'The emotions I was feeling, were those of confusion. Since I never worked in a group, I did not know what to do,' Deon.*

He considered online learning as additional work he could do without. To make matters worse he had an outdated computer and poor Internet connectivity (Section 5.4.2.1). This discouraged him from using the VLE. He was also a technophobic student, who felt 'a wall, a barrier' (Section 5.5.2.1) when he accessed the VLE.

> *'I was not very skilful in computers. I was never a computer person,' Deon.*

He was ready to recommend online activities to others but he was not ready to take them up himself.

> *'I generally recommend similar online activities. Yes I do, but personally I don't like it so much,' Deon, personal reflections, November, 2007.*

In spite of these constraints Deon wanted to do well in his studies:

> *'..but when you told us that this work was part of the homework I thought of it differently,' Deon.*

This was Deon's turning point. He changed his attitude regarding online learning when, in the ad-hoc interviews, he realised that the work was not optional. Deon became persuaded that the online chemistry content was of great relevance to his learning needs. The following is an email which the student sent me to express his new attitude.

> *'I want to let you know that I am getting used to this useful site now. Today, for the first time, I have learnt something new through this site. Hybridisation was really explained well in Moodle. Moreover, I am being much more active than last time regarding the assignment of Atomic Structure. I am starting to appreciate the significance of the site now,' Deon, email 13.12.2007.*

The challenge was taken, the hurdles were overcome. After two months, persuasion point was reached and Deon accepted the VLE as a resource for learning. He gained confidence, found satisfaction and became an enthusiastic collaborative learner.

> *'I used to take the lead and tell others to get together to do the work- Listen we have work to do,' Deon.*

The following comment indicates the change in this student:

> *'I can use Moodle and understand its significance....Before, I looked only at email copies. I was learning chemistry through emails...but with Moodle I worked with my group in the wikis I was with all the class from home. Communication even during holidays...better than teacherials! I had the opportunity to get used to using the computer,' Deon.*

The persuasion stage and decision point occurred with the realisation that the work in the VLE was relevant to the student's needs. Many times Deon used a friend's computer to do the work. He effectively dealt with his setbacks.

iv. Naomi

> *'It was a nuisance to go on the Internet and remember that there is Moodle work.....' Naomi.*

Naomi was not keen to enrol in the VLE. She associated the Internet with leisure and fun. She felt rather annoyed to use the Internet for study. To make matters worse she found the VLE interface confusing.

> *'Other websites take you through links from one page to another. In Moodle it felt odd, everything is on the front page- that is why it was more confusing. I did not realise I had to scroll down to find the groups. It was frustrating. I could not tell how the others could see their group.' Naomi.*

Naomi was familiar with social networks and although she could cope well with other websites she was unable to navigate in the VLE. It took Naomi several days to realise where the groups were listed in the VLE. She also expected others to be online at the same time. In another episode, Naomi could not access the simulated experiment which was an external link in the VLE and she ran to her mother for comfort.

> *'I cried; miskina ommi (my poor mum); when I could not access the external site,' Naomi.*

Despite all this frustration, Naomi was resilient and persisted to do the online tasks. She always did her work as far as wikis and group-work were concerned, but she was not using the VLE for whole-class discussions.

> *'In the first months, I was only doing what was required....just the wiki work, nothing more. I always thought, the other students were doing more work in the VLE,' Naomi.*

After two months, she learnt to deal with her former 'Internet for leisure only' problem:

> *'Before I used to fit it with Internet leisure time and that is when online chemistry annoyed me, Now, I consider it as part of study. If I set a time aside, let's say I'll dedicate a whole afternoon to it, it is ok,' Naomi.*

Naomi experienced difficulties in working mathematical calculations. She started to work through examples and discussed these with others in whole class discussions.

> *'For the gases and equilibria I really used it. With gases I did not understand what was going on, because of the maths, not because of the actual concept; so I started doing the examples and discussing with the others, and it worked out well,' Naomi.*

This was her turning point. After two months, Naomi viewed online learning from a different perspective and began to see it as a source of learning.

> *'I liked the idea. Then I did the same with the equilibria, which also helped me through. I wish I had realised with the redox, because even for redox, I would have done the same and I really needed to work through more examples, but I did not realise that I could use the Moodle discussions at the time,' Naomi.*

In small group-work, she collaborated and discussed with another student, and together they moved ahead ignoring two other students who did not collaborate in the group.

> *'Me and Celine, we always try a question each and then we discuss all the work thoroughly. I do not know who else was with us. We ignored the ones who did not work,' Naomi.*

The student persisted as she worked through the activities in the hope to improve her learning.

> *'I used Moodle, it was useful, it was there to help me with the tests. There was more work to do and discuss with the others,' Naomi.*

Naomi overcame all her concerns, made time for online study and trusted that the VLE could be useful for her learning. She used it well when it became relevant to her learning needs.

v. Marianne

> *'……I read email copies only…I did not say anything as I thought I was the only one who could not use Moodle,.' Marianne.*

This Crescendo student was cyberphobic, and was not into social networking. She had an email account and for the first three months, she preferred to read email copies of the online discussions. She feared posting messages in the VLE for two reasons – a technological fear of deleting sections of the VLE content and a fear to discuss due to a lack of self-confidence in chemistry. In the first term, Marianne also had personal family problems and being emotionally low, she accessed the VLE infrequently. However, this student read email copies of the discussions in the VLE and was learning from them. This persistence kept the student informed of what was going on in the VLE.

> *'I was not understanding the chemistry concepts. I had personal problems and could not concentrate in class. I had too many difficulties in chemistry. I was panicking; I felt that I had 'dari mal-hajt' (literally meaning – my back to the wall). I had to do something to recover from my state. So I took the plunge. Until I submitted my first post, I was on tenterhooks,' Marianne.*

As the above comment shows, the turning point, which happened after three months, occurred when Marianne felt pressured to seek help. With great apprehension, she submitted her first posting:

> *'I feared I would do something wrong, whether I would delete part of Moodle. I was afraid. Every day for many weeks, I was telling myself that I would post my difficulties in Moodle. Then, after three months, I got started, I felt so glad and satisfied when I posted for the first time. Each time I posted in the first days, I used to run upstairs to tell my mother,' Marianne.*

The student was delighted when she received the response to her first posting from another student. Online communication with other students was the persuasion stage:

> *'I could not believe it, when someone answers, it is really great. I hardly knew anyone in the class, almost no one,' Marianne.*

She also managed to approach other students whom she got to know well through the online discussions and changed her former student-selected chemistry group which was not functioning well (Section 5.10.2.2). The following comment reveals the student's recovery from her setbacks:

> *'Moodle made a difference to my study. It changed many things. It gave me the courage to ask. I felt the class was also with me at home, I became confident and was learning,' Marianne.*

Family problems, fear of deleting text in the VLE and lack of self-confidence hindered this students' online participation. Nonetheless, persistence was indicated when she remained in touch with the VLE through emails. The persuasion point occurred when the student made an effort to post in the VLE and received a response. Getting to know other students in the class through the VLE and joining a hard working group to tackle problem-solving activities was a meaningful learning experience of online participation for this student.

vi. Lois

> *'I never switch my computer off – day or night. I prefer to do my homework like essays in English and Biology with my computer. It is easier; but Moodle was complicated. It is different to other websites,' Lois.*

Lois was quite familiar with using the computer. In the first week, he was curious about online learning.

> *'I had no idea what it was about, one would want to use it to find out,' Lois.*

However, although accustomed to use the computer for study, he became reluctant to use the VLE. He found the interface different to other websites, and claimed that the VLE was complicated to use. In the students' reflective journal and in the individual interview he confirmed that it took him a long time to get used to innovations.

> *'It takes me a lot of time to get used to things. It took me a while to find where everything was in Moodle. It had many things – chat rooms, discussions, wikis. I was getting confused with what I was supposed to do and I did not use it,' Lois.*

Lois admitted that he did not contribute to the first collaborative task and the other members of the team did most of the work. Another concern was his shyness and lack of self-confidence.

> *'I am a shy person. I do not take part in conversations because knowing that everybody will read what I say, I fear I say something stupid,' Lois.*

He did not feel comfortable to take part in whole-class online discussions in the first three months of the course. Collaboration in small group-work, where group members were selected by the students themselves turned out to be a discouraging experience as he was the only student attempting to do the work (Section 5.3.3.1).

> *'I ended up doing all the work by myself to hand it on time. 'Inhraqt' (literally means burnt up). I did not want to do any more Moodle,' Lois.*

Lois felt that he was falling behind in class and desperately needed learning support. This is when he became determined to discuss in the online forum.

> *‘I was not doing well in tests. I was not obtaining high marks and I wanted to do well. I turned to Moodle. I asked a question and then Sylvia replied to my question. Then she asked something and I answered. That is how it started. I was then reading all threads and discussing with others,’ Lois.*

Lois was encouraged to use online learning when he had a response from another student to his query. This was the persuasion point.

> *’It's good to know that there is Moodle to turn to when you want to ask something, or if you want to work out some exercises,’ Lois.*

Lois had his setbacks, his difficulties, and confusions. He turned to the VLE when he realised that he was underachieving in class. The persuasion stage to participate in online learning occurred, after three months, when he had fruitful discussions with another student. At this point, he made the effort to navigate in the VLE and overcome his shyness.

5.5.4.2.3 Conclusion

The above section described the journeys of six Crescendo students to full online participation amidst uncertainties and confusion. All twelve Crescendo students persisted and obtained more knowledge (Rogers, 2003) about the potential of the innovative mode of learning, despite their setbacks. The blended context supported the students’ resilience; during the persuasion period, the students were in direct contact with the rest of the class and the chemistry content through the face-to-face setting. This enabled them to take their time to reach the decision and confirmation stages without losing track of learning events or contact with the learning community. This is not possible in fully online courses. E-mail copies of the ongoing online activities and in some cases, the visible VLE fora also kept all Crescendo students informed. In contrast, the Diminuendo students did not show the disposition of resilience. Their interest in online learning declined and they did not manage to overcome their setbacks.

5.5.4.3 Learning Disposition of Reciprocity

A crucial disposition for online learning is doubtlessly the learning disposition of reciprocity, which focuses on the social dimension of learning. Claxton and Carr (2002) referred to reciprocity as a reciprocal and responsive relationship with others. Reciprocity in this research context denotes an interacting relationship between learners, where an interchange of ideas in response to questioning and problem-solving activities took place in asynchronous communication in the discussion fora and in the wikis. It resulted in the creation of learner generated knowledge (Section 4.3.3). This disposition was crucial for learners participating at the knowledge building level to co-construct their knowledge through participation (Gunawardena, Lowe and Anderson 1997). Reciprocity promoted student learning through active engagement and a socio-constructive approach to learning. Students, who lacked this disposition, were unable to cope with the third challenge which was to discuss and contribute to the generation of knowledge in the online environment.

Claxton and Carr (2002) explored the learning disposition of reciprocity. They stated that learners with this disposition have an awareness to articulate learning processes, opinions and problems, and the courage, confidence and ability to communicate these to others. Furthermore, these learners demonstrate an inclination to interact with others, take into account the opinions and needs of others, and clarify and seek understanding for oneself and the group. Despite the fact that Claxton and Carr (2002) studied the disposition in early childhood settings (Section 2.3.1.1), the indicators, which they suggested also apply to this research. These indicators are a willingness:

- to engage in joint learning tasks;
- to express uncertainties;
- to be questioning;
- to take a variety of roles in joint learning enterprises;
- to take others' purposes and perspectives into account.

Successful online participation in this course depended on the possession of this disposition, which was either already, a characteristic of the

student at the beginning of the course or was eventually developed through observation and imitation (Katz and Chard, 1998; Carr, 1995; Claxton and Carr, 2002; Duncan, Jones and Carr, 2008)

5.5.4.3.1 Reinforcing the three presences

Reciprocity was crucial to create and maintain the cognitive, teaching and social presences (Figure 5.7) as described in the Community of Inquiry model (Garrison, Anderson and Archer (2000); Section 2.1.3).

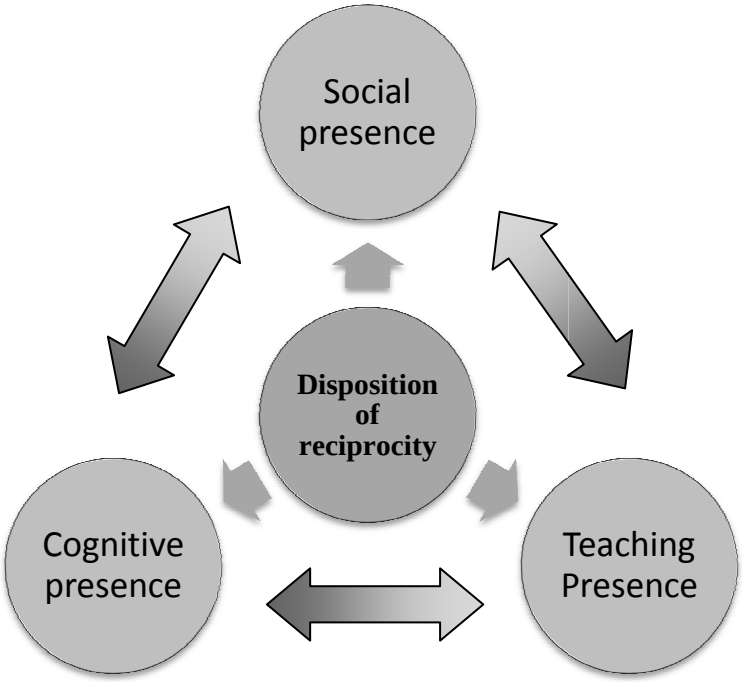

Figure 5.7 Relationship between the disposition of reciprocity and the three presences

The cognitive and teaching presences were maintained by learners in the discussions in the fora and in the wikis. The following comment illustrates how a Moderato student visualised learning in the online community.

> *'…. (In Moodle) you always continue learning; you see everyone, it is like a process, adding to the knowledge which one already has…,' Carmen (Moderato), individual interviews, May 2008.*

The VLE provided a medium which, as the above student remarked, allowed the students to observe each other learning. This was different to the face-to-

face class scenario, where each student was conscious only of his learning through learner-teacher and learner-subject content interactions. In the online setting, learners could compare their understanding to that of other learners. This created an environment where learners clarified and reinforced their understanding of concepts together. Cognitive presence (Section 2.1.3.3) was created as students constructed and confirmed meaning through reflection and discourse (Kanuka and Garrison, 2004) in problem-solving activities in both small group-work and whole-class discussions. In this process they listened to each other, developed as inquirers, explored solutions and discussed together and with the teacher.

> *'In our group, we try to work the problem on our own. I do my research and be the first to put my answers in the wiki. My friends add more sections. Then we discuss and leave the good parts as an answer. There were times they did not know how to answer. I explain the work. I would know that what I say is correct. If it makes sense, it is correct,' Anthony (Marcato), individual interviews, May 2008.*

The above comment reveals a scenario in small group-work, where the Marcato student helps other students who were in the zone of proximal development (Section 2.1.2.3.ii).

Learner-learner interactivity was the 'heart and soul' (Pelz 2004, p37) of this online course. Teaching presence was created as online participant students facilitated discussions, taught each other and learnt from each other (Garrison and Anderson, 2003) while they discussed and shared problems in fora and in wikis.

> *'The discussions were good as I liked to see what other students think and what their difficulties are; how they solve them. Sometimes I had the same difficulties,' Sarah (Moderato), individual interviews, May 2008.*

Sarah did not participate in whole-class discussions, and yet as her comment shows, the students who were read only participants in whole-class discussions were also learning through the generated teaching presence. This was complemented by the teacher's 'constructive critique and formative feedback' (Lehman and Conceicao, 2010, p 11).

A disposition of reciprocity was also essential to generate social presence (Short, Williams and Christie, 1976; Garrison, Anderson and Archer, 2000). As discussed in Section 2.1.3.1, social presence, defined as the ability of learners to project themselves socially and emotionally in a community of inquiry (Garrison, Anderson and Archer, 2000) is crucial to maintain both cognitive and teaching presence (Lehman and Conceicao, 2010; Palloff and Pratt, 2009). It is). The following comment illustrates how the reciprocating behaviour of the students in the course changed the virtual space into a 'place' (Al-Mahmood, 2006, p44) - a safe and comfortable place for meetings at any time, outside the College walls.

> *'Normally, one does not go around asking others, - I cannot understand this concept bla bla bla, but in the VLE, since everyone is there discussing and asking, you feel, I am not on my own, it is comforting, I can ask in here, this is what this is for,' Carmen (Moderato), individual interviews, May 2008.*

The three aspects of social presence (Section 2.1.3.1): social, psychological and emotional (Lehmen and Conceicao, 2010) were evident in this online class.

The *social* aspect was indicated when online participants felt a connecting experience with others and a sense of belonging to the online community.

> *'Moodle bonded the class together. …even in the first online task, when no one knew each other, you get to know others quickly it was good to mingle with others..… Online one feels comfortable asking about a particular problem. There is time to write it in one's own words. It feels more comfortable.…This chemistry class has a sense of community.,' Francesca (Diminuendo), class interviews, May 2008.*

The psychological aspect was denoted by a high sense of telepresence where, as in the following example, the learner disregarded the physical place, and projected himself into the virtual community (Kiousis, 2002). The technology became transparent (Lombard and Ditton, 1997)

> *'In Moodle, it is like you are talking to someone else…you forget you are at home on your own and using the computer; you are revising with someone else; not with books and notes; time flies, you learn more; you feel you are not studying on your own,' Marcus (Crescendo), in-depth interviews, May 2008.*

The emotional aspect of social presence was shown by the ability to genuinely show feelings through words, symbols, and interactions with others in the online environment.

> *'Can you pls help me out with this; I am panicking. I feel at a great loss with this chemistry assignment; For Question 2(b) did you find anything? Please help me because I feel helpless,' Adela, (Moderato),VLE radioisotopes small group assignment, November 2007*

Adela was an extremely shy student, who rarely posted in the forum or talked to anyone in the face-to-face class; however, she felt that the place was safe enough to express her emotions. The existence of the three presences created a learning community, which was evidenced by a sense of connectivity, the co-construction of knowledge and social learning.

5.5.4.3.2 Conclusion

The previous section presented the evidence for the existence of the learning disposition of reciprocity, which is crucial for collaborative learning. The disposition was demonstrated by an interchange relationship of discourse in asynchronous learning spaces such as discussion fora and wikis, where (Garrison Anderson and Archer, 2000) the Moderato, Crescendo and Marcato students generated and maintained cognitive, teaching and social presences.

The learning design provided the opportunity for the development and cultivation of this disposition (Duncan, Jones and Carr, 2008; Wakefield, 1993). The disposition appeared to become robust (Claxton and Carr, 2002) (Section 2.3.1.3) as it was transferred to new challenging contexts; some Crescendo students, who participated in small group work, seemed to gain self-confidence in mediating learning and eventually joined whole-class discussions. The students eventually also showed a disposition of reciprocity in the face-to-face contexts (Section 5.10.4). Students who developed this disposition changed from passive learners in the face-to-face class to non-collaborators in the online discussion fora and then to active learners (Section 5.5.4.5; Driscoll, 2004, Liu et al, 2002).

A disposition of reciprocity was essential for the resolution of the socio-cognitive conflicts which developed in problem-solving activities where students learnt through discussions with more knowledgeable others in their zone of proximal development (Sections 2.1.2.1 and 2.1.2.3: Vygotsky, 1978; Biott and Easen, 1994). The disposition was vital for learner interactions where learners together analysed and interpreted data and solved problems (Hirumi, 2006; Bates, 1995). It led to the co-construction of their knowledge through participation in collaborative activities (Gunawardena, Lowe and Anderson, 1997). In Section 5.5.4.5, I discuss how learners with this disposition took on key roles in the online learning community.

5.5.4.4 The learning disposition of taking responsibility for learning.

Anderson and Prawat (1983) stated that a sense of responsibility is made visible by behavior, and is affected by invisible components such as beliefs and attitudes. Claxton (1999) and Carr (2001) listed the disposition of responsibility as a requirement for learning (Section 2.3.1.1). In this section, I describe the behaviours of the Marcato, Crescendo and Moderato students, and provide evidence that a sense of responsibility was needed for the building of the online learning community. The learning disposition of responsibility is discussed in two parts:

- Disposition of taking the responsibility to manage one's learning;
- Disposition of taking the responsibility for the learning of other students.

5.5.4.4.1 The disposition to take responsibility to manage one's learning

This learning disposition was indicated when students managed their own learning and became self-directed learners. As discussed in Section 2.2.5.1.iv, self-directed learners are able to assess their needs, secure learning resources, implement learning activities and evaluate learning (Brockett and Hiemstra, 1991; Guglielmino and Guglielmino, 2003); they take control of the learning process by employing self-regulatory and resource management strategies (Miltiadou and Savenye, 2003; Pintrich and De Groot, 1990).

The variety of activities especially the online asynchronous discussions in the fora and the problem-solving activities in the wikis, gave the students the chance to reflect on their learning needs and choose their way forward. They gained control over (1) what they needed to learn (2) how to learn it and (3) the time needed for learning (Section 5.10.1.2). Black et al (2003, p.97) stated, that 'offering students, activities and time to become successful learners, enhances their self-esteem and encourages them to learn more.' The students were accustomed to rely on the teacher's sense of responsibility for their learning by learning what the teacher wanted to teach them through lectures and handouts. Online learning gave rise to a shift in learning responsibility from the teacher to the learner and it changed the way students studied.

As discussed in Section 5.5.4.1.2, the Marcato student was a resourceful student, who had confidence in his abilities to research and to understand concepts, who was ready to explain to other students and, who at the same time assessed his own learning. The online participants, e.g., Kate, Jodie, Naomi, Lois (Section 5.5.4.2.2), and Paula (Section 5.10.2.3) showed a disposition to take responsibility for their learning, when they took the initiative to work without the teacher's intervention, tackled more work and became less teacher reliant (Gibbons, 2002; Guglielmino and Guglielmino, 2003).

Some learners developed self-regulatory strategies (Miltiadou and Savenye, 2003; Pintrich and De Groot, 1990) to master the subject content. Similar to the Marcato student, they eventually became capable of managing their own learning by assessing their learning, determining what was relevant to their needs, and choosing what and how to study (Zimmerman, 1994).

> *'Once I got started doing the work you were giving us in Moodle, I realised that even when you say something in class, I was more prepared, and I was understanding more. Even the questions in the exam past papers which we were discussing in Moodle helped a lot - I was understanding them better. I felt confident to find and tackle more questions in past papers and do them,' Kate (Crescendo), in-depth interviews, May 2008.*

Doreen, the Crescendo student, who had said that researching and problem-solving were tedious (Section 5.5.4.1.3) developed the disposition to take responsibility for her learning by becoming conscious of her learning needs,

developing an interest in doing research and showing a determination to achieve mastery of the content.

> *'Moodle changed the way I studied. Through Moodle I developed an interest in looking up things that I did not understand. If I do not solve the problem, I discuss it in the forum,' Doreen (Crescendo), in-depth interviews, May 2008.*

This disposition was indicated in different ways; students developed different strategies such as observing other students, e.g., Sarah (Section 5.5.4.3.1), persisting to solve problems and to compare their understanding with that of other students. Kelly, like Kate and Naomi (Section 5.5.4.2.2) persisted to solve problems:

> *'I use Moodle to revise. I try the easy examples and then do the complicated ones. If I have problems, I look at the discussions and then try to work them out again,' Kelly (Moderato), individual interviews, May 2008.*

Paula observed other students and developed strategies to imitate them:

> *'…I watched the others work hard and participate, especially Kate and Anthony. I used to tell myself, why should I not do so as well…" Paula, (Crescendo), in-depth interviews, May 2008*

She used help-seeking strategies such as learning from others and discussing with them (Zimmerman, 1994; Pintrich and De Groot, 1990, Pintrich, 1999).

> *'I stay online because if I have difficulties, I go to see the work which others did in the wikis. I also ask the others (in Moodle) if I do not understand,' Paula (Crescendo), in-depth interviews, May 2008.*

The online participants developed a disposition to take responsibility for their own learning, and became able to manage their own learning. As Levinas (2002) argued, being responsible is prior to what a person intends to do. These learners were able to develop the dispositions of resourcefulness and of reciprocity because they felt responsible for their own learning. Similarly the Crescendo students showed that they were responsible for their learning when they faced challenges and persisted through their confused states (Section 5.5.4.2.2). The online learners took ownership of their learning process and from non-collaborators in the online medium and in the face-to-face class, they became self-directed and collaborative learners.

This section showed that the indicators for a disposition to take responsibility for one's learning are the development of:

- self-regulatory strategies such as identifying needs in the learning process, assessing and evaluating learning;
- resource management strategies which include effective study skills.

5.5.4.4.2 The disposition of taking responsibility for the learning of other students

In whole-class discussions and in small group-work, the learners established a sense of community and ensured a flow of information, social support, commitment to group goals, and satisfaction with the learning experience (Rovai, Wightinga, and Lucking, 2004). Abedin, Daneshgar and D'Ambra (2010) remarked that learners who have formed a community, feel a sense of belonging, of connectedness, of cohesion, of community spirit, of membership and of influence. These authors added that learners with a sense of community respect, trust, rely on each other, share emotional connection and are aware of each others' activities, perspectives and needs. Palloff and Pratt (2003) considered a disposition to take on the responsibility for community formation as an essential learner characteristic for online learning (Section 2.2.5.1) and added that the individual learning process of the virtual student is dependent on the participation and commitment of the other students in the group. This section provides evidence of students who developed the disposition to take responsibility for the learning of other students in both small group-work and whole-class discussions.

a. Small group work

The following comments indicate the disposition of taking responsibility for the learning of other students in small group work:

> *'I feel greatly responsible for the others to learn. If it is just me, I may postpone doing the work, but in our group I do it. I know the others depend on me. I'd be very concerned. You do the work willingly for yourself and for the team,' Doreen (Crescendo), in-depth interviews, May 2008.*

> *'The fact that I was not just helping myself but also helpful to others, I felt more responsible and as a result I was more careful*

than usual when answering,' Deon (Crescendo), in-depth interviews, May 2008.

Another Crescendo student, with a feeling of commitment to group goals, remarked:

'Being in a team is encouraging. Other people encourage you to do your work; it is not just you. You do the work both for your own good and for others. You do not want to let them down,' Marianne (Crescendo), in-depth interviews, 2008.

The Moderato students were shy or lacked confidence to discuss in large groups (Section 5.5.2.2). However, these inhibitions did not surface in small group-work, and the students were willing and able to take responsibility for the learning of other students in the group by collaborating, caring and supporting each other (Abedin, Daneshgar and D'Ambra, 2010).

'In my group, we divide the work between us and then we discuss and mark each others' work. I do my best. It is a responsibility towards the group,' Carmen (Moderato), in-depth interviews, May 2008.

In some groups, as in the case of Deon (Section 5.5.4.2.2), learners demonstrated a great sense of responsibility when, out of their own free will, they took the lead and organized the work in the group.

'I took charge of the group, because, I was seeing other groups posting their work, and we had not done anything,' Paula, (Crescendo) in-depth interviews May 2008.

The Marcato student took it upon himself to visit the wikis of other small groups and help them in problem-solving activities.

'I looked at the work in other wikis. In one group, they had some structures which were drawn incorrectly. I joined their discussion in their wiki to help them,' Anthony (Marcato), in-depth interviews, May 2008.

In contrast, teams, which did not function well, had members who lacked this disposition. As in the cases narrated by Carmen (Section 5.5.4.1.2) and Lois (Section 5.5.4.2.2), this lack of responsibility in some students is also evident in the following comment:

'I sent a message to Larry. I told him - please do your part of this work. Clare and I did almost everything. We even spoke to him at

school so that he'll do his bit. ... We were waiting for him to post all the time....,' Sarah (Moderato), Class individual interviews, May 2008.

b. Whole-class discussions

The Marcato student (Section 5.5.4.1.2), two Crescendo students and one Diminuendo student who were the active participants in the first term were conscious of the learning needs of other students. With a sense of responsibility, they researched their work and carried out whole-class discussions (Section 5.5.4.3.1). A sense of responsibility was also shown when one of the Crescendo students remarked that she would inform the group if she had uncertainties.

'If I am not sure of what I am writing I would say so and continue with the discussion to see what the others think,' Kate (Crescendo), in-depth interviews, May 2008.

In the week before each chemistry face-to-face class test, the Marcato student made himself available online on all evenings to discuss problems posted by other students. Following this, he also became a constant support to students in chemistry and in another subject at the College (Section 5.10.4).

As evidenced in the following comment, the active learners in whole-class discussions created a community spirit and a sense of belonging amongst the participating students,:

'Moodle bonded the class from the very start. It kept the class together throughout the year. We all knew we could ask in Moodle….Moodle helped us to get to know each other and gave us the chance to help each other,' Sylvia (Crescendo), in-depth interviews, May 2008.

The disposition of taking responsibility for the learning of other students was expressed in terms of (1) keeping the group together in small group-work, and (2) helping students understand chemistry content in both small group-work and in whole-class discussions. This study showed that the indicators for the disposition of taking responsibility for the learning of other students in both small group-work and in whole-class discussions are a willingness to:

- be caring, open, honest, reliable;
- take roles;
- visit frequently the online environment to respond to posts with problems/issues;
- research problems and issues raised by other students;
- actively take part in discussions;
- ensure that the issue/problem has been solved and understood by all concerned;
- convey a spirit of collaboration and connectedness.

5.5.4.4.3 Conclusion: A learning disposition to be responsible for learning

This disposition was discussed from two main aspects of responsibility, i.e., taking responsibility for one's own learning and responsibility for the learning of others. In the first case, this disposition was crucial for learners to become self-directed learners and develop self-regulatory and resource management skills. In the second case, the disposition was crucial for collaboration and community formation. Palloff and Pratt (2003) remarked on the robustness, breadth and richness of the disposition of responsibility. They stated that students who take the opportunities to become responsible learners are empowered to move to other learning experiences with an even greater sense of responsibility and accomplishment. This was shown by some of the students when they became responsible students supporting each others' learning also in the face-to-face environment.

5.5.4.5 The learning dispositions and changes in the students as learners

The research sub-question 2.1, concerns the changes in the students as learners. The development of new learning dispositions and the resulting characteristics of the online learners, e.g., reciprocity, being responsible, resourceful and resilient were changes which the students experienced as online learners. The discussion on learning dispositions highlighted changes in the study patterns, study habits, roles and modes of learning. As a result of this, the students became self-directed and collaborative learners. In this section, I discuss the observed changes in the roles of the learners in this online community.

The active online community consisted of a triadic set of learners who took on the roles of non-collaborators (NC), help-seekers (HS), or knowledge-mediators (KM). Although these roles existed in both small group-work and whole-class discussions, they were more pronounced in whole-class discussions, and for this reason this discussion focuses mainly on whole-class discussions.

In whole-class discussions, the non-collaborators were the students who were aware of what was happening in the VLE, but did not take an active part in the discussions. The help-seekers posted questions about chemistry issues and then took part in the discussions which they themselves had initiated (Section 5.5.4.5.2b). The knowledge-mediators had an inquiring mind and were keen to research and to learn on their own. They eagerly tackled problem-solving tasks, responded to postings initiated by the help-seekers and by the teacher and discussed with other learners in the VLE (Section 5.5.4.5.2c).

Table 5.8 The number of students in particular roles in whole-class discussion fora at the end of each term

Behaviour Group	**Term 1**			**Term 2**			**Term 3**		
	NC	HS	KM	**NC**	HS	KM	**NC**	HS	KM
Marcato (1)	0	0	1	0	0	1	0	0	1
Crescendo (12)	10	0	2	3	5	4	0	4	8
Moderato (9)	9	0	0	9	0	0	9	0	0
Total (22)	19	0	3	12	5	5	9	4	9

Table 5.8 indicates the number of Moderato, Crescendo and Moderato students in particular roles at the end of each term. They formed the active online learning community of 22 learners. The number of learners in each role was obtained after analyzing the extent of participation by the students in the discussion fora, the tracking system in the VLE and from data generated in the interviews (Section 3.12).

The discussion in this section does not focus on the students who did not contribute greatly to this active online community, namely the Diminuendo students who participated only in Term 1, the Staccato students who were occasional participants throughout the course and the Ritenuto students who did not access the VLE. In the first term, one Diminuendo student was a knowledge-mediator.

Table 5.8 indicates that:

- the Marcato student and two Crescendo students were knowledge-mediators throughout the course;
- the number of Crescendo non-collaborators decreased from 10 in Term 1 to 3 in Term 2 and to 0 in Term 3; The number of Crescendo help-seekers increased from 0 in Term 1 to 5 in Term 2 and then decreased to 4 in Term 3; the number of Crescendo knowledge-mediators increased from 2 in Term 1 to 4 in Term 2 and to 8 in Term 3;
- the nine Moderato students were non-collaborators in whole-class discussions throughout the three terms.

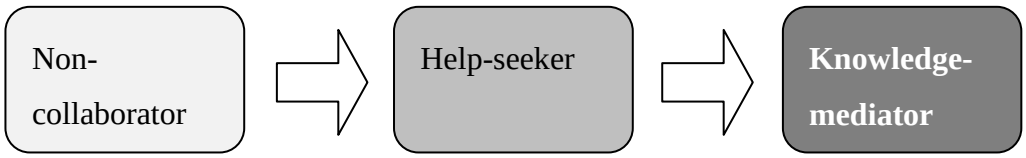

Figure 5.8. The three learner roles in whole-class discussions

Hence, from Term 1 to Term 3, the number of non-collaborators in whole-class discussions decreased and the total number of knowledge-mediators increased. A shift in learner roles took place (Figure 5.8).

5.5.4.5.1 The three learner roles model

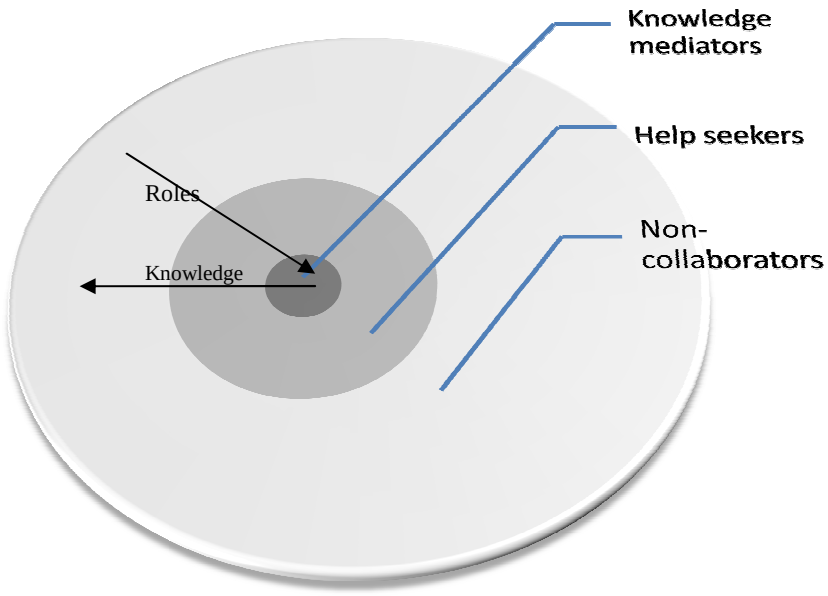

Figure 5.9. The three learner roles model

This online learning community with a 'triadic set' of actors was in some ways similar to the community of practice in the legitimate peripheral participation model (Lave and Wenger 1991, p.56). The activity in the whole-class discussions is portrayed in the three learner roles model (Figure 5.9), where the knowledge-mediators, like Lave and Wenger's (1991) old-timers are visualised at the core (Section 2.1.2.3.iii), surrounded by the help-seekers, and by the non-collaborators at the periphery (See Figure 5.9). The knowledge-mediators and the help-seekers with the learning dispositions of resourcefulness, reciprocity and responsibility interacted in the discussions and co-constructed their knowledge. This community had no novices or old-timers, but similar to the Lave and Wenger (1991) model there was a flow in roles and knowledge. Two processes were taking place in opposite directions:

- knowledge generated by the knowledge-mediators flowed from the core to the periphery and became available to the whole community;

- a flow of roles took place from the periphery to the core as non-collaborators became help-seekers and some of the latter became knowledge-mediators;

5.5.4.5.2 The three learner roles in whole-class discussions

This section describes each of the three roles. This is followed by a discussion of the evidence for the existence of the three learner roles model.

a. The non-collaborators

The online non-collaborators included the Crescendo students before they changed their roles to help-seekers and the Moderato students. It seems that, although the non-collaborators were not participating in whole-class discussions, they were learning from them:

> *'..I wanted to stay in touch with the class and be updated with what is happening. I was learning from it. If I do not login for some days, I make it a point to login and see what is new. I always felt that I want to know what is going on, being a part of it…,'Kelly (Moderato), individual interviews, May 2008.*

These students considered the discussions as a source for learning. In the three learner roles model, the non-collaborators were at the periphery as observers and readers. Some of these were hoping they would be able to join the discussions.

> *'I do not feel comfortable discussing with all the class in Moodle. I never tried, but one day I wish I do it, hope it will be in the near future! I always follow what the others are saying and what they write is important' Anon, Questionnaire 3, February, 2008.*

The non-collaborators did not show any of Claxton and Carr's (2000) indicators for the disposition of reciprocity. Responses to Questionnaire 3, and the individual interviews revealed that non-collaborators were either students who had a shy or reserved nature or lacked self-confidence.

They feared that they

- would appear presumptuous;
- were not able to explain in a comprehensible manner;
- were not competent to contribute towards the solution of a problem;
- would write incorrect facts, or give absurd answers, or give the wrong explanation and be vulnerable to criticism by other students.

The following comment illustrates some of the above factors. These were also discussed in Section 5.5.2 and 5.5.4.4:

> *'I do not discuss in the large forum. I fear that the others will not understand what I say. Very often, I feel I do not know enough chemistry to discuss with them,' Clare (Moderato), in-depth interview May 2008*

Some non-collaborators were comfortable to access the discussion at a late stage when problems were solved and discussions were terminated.

> *'Sometimes I enter the forum at a late stage when the problem would be solved. This works well for me as many times I would not know what to say when they discuss, and I prefer to wait for others who know more to reply,' Marcus (Crescendo), in-depth interviews, May 2008.*

The permanency of the written medium aggravated the situation (Mason and Weller, 2000 and Sweeney, O'Donoghue and Whitehead, 2004); some passive learners feared that they would make fools of themselves by what they post in whole-class fora. Their postings would remain visible for everyone to see.

Most Crescendo students were at one time non-collaborators in whole-class discussions but with a disposition of resilience, they were able to move forward and change their roles to help-seekers and/or to knowledge-mediators.

b. The help-seekers

In this online learning community, the term 'help-seekers' refers to the students who sought help by posting questions in whole-class fora. Three Diminuendo students were help-seekers in Term 1, but unfortunately, these students did not use the VLE (Section 5.3) in Terms 2 and 3. The knowledge-mediators also responded to posts initiated by the teacher. Table 5.8 indicates that the

Crescendo students were the help-seekers in Terms 2 and 3 in whole-class discussions. A marked increase is shown in the number of Crescendo students taking part in whole-class discussions from Term 1 to Term 2. At this stage the students became aware of the usefulness of online learning. They took the risk to ask when they needed help.

> *'It was urgent. We had a test the next day and I could not wait for other students to ask. So I asked in Moodle,' Marcus, (Crescendo), in-depth interviews, May 2008*

> *'As I study I check to see whether someone else had the same difficulty. If I do not find anything similar, I start the discussion,' Lois, (Crescendo), in-depth interviews, May 2008*

The decrease in the number of help-seekers in Term 3 is due to the fact that four of the five help-seekers in Term 2, became knowledge-mediators in Term 3. The Crescendo non-collaborators (n=3) in Term 2 became help-seekers in Term 3.

Students with the role of help-seekers showed characteristics which are the same as the indicators for the disposition of reciprocity as described by Claxton and Carr (2002). These were:

- a willingness to express uncertainties;
- a willingness to be questioning;
- an ability to understand their own problems and difficulties;
- having a sense of occasion, when to ask;
- having a sense of entitlement and the confidence to ask;
- an ability to formulate the right question;
- ability to discuss in order to resolve issues.

The help-seekers were instrumental for initiating and sustaining several online asynchronous discussions. Similar to the knowledge-mediators, they interacted with other students and sustained the cognitive, teaching and social presences (Garrison, Anderson and Archer, 2000) in the online setting. Some, eventually developed the skills to mediate knowledge to others, and progressed from help-seekers to knowledge-mediators.

c. The Knowledge-mediators

Table 5.8 indicates that the Marcato student was a knowledge-mediator during the three terms. The number of Crescendo students as knowledge-mediators increased from 2 in Term 1 to 4 in Term 2 to 8 in Term 3.

The following comment from the Marcato student reveals the characteristics of knowledge-mediators

> *'I see what problems other students have. I was not always able to solve problems, but I used to do some research, so that first I understand the concepts well and then I help the others; and I could tell how well I knew the topic myself,' Anthony (Marcato), individual interviews, May 2008.*

All the indicators given by Claxton and Carr (2002) (Section 5.5.4.3) correspond to several characteristics of the knowledge mediators. They are a willingness to:

- understand the issues and problems under discussion;
- research issues and have a determination to find a solution;
- be receptive to the problems of other students and to be aware of their learning;
- discuss issues with other students and help them understand;
- be aware of their own learning process and to assess their own learning as they (i) understand the problem, (ii) as they research the issue and (iii) as they discuss it with others.

The knowledge-mediators similar to Lave and Wenger's (1991) old-timers unfolded their skills in research, communicating knowledge to other less active or inactive participants. They were self-directed learners and contributed to the cognitive presence (Garrison, Anderson and Archer, 2000), as they tackled the problems which were presented by the teacher or by help-seekers. They were pleasantly challenged by the problem-solving tasks, but they felt these tasks to be within their regime of competence (Gee, 2003). They explored the issue and discussed it with other participants in the forum or wiki.

> *'Many a time I have to look up books to discuss in the forum. If I am not sure, I say so, I learn while I research to answer other students,' Anthony (Marcato), Focus Group interview 1, April 2008*

These students were aware of their own learning. They created teaching presence where they facilitated the learning for themselves and for other learners. The knowledge-mediators readily went through the cycle of expertise, which allows a flow between practice and new learning and between mastery and challenge (Gee, 2003). They took risks and explored the area that they were about to learn. They saw obstacles as challenges (Gibbons, 2002) and not as a form of discouragement.

Knowledge-mediators had or developed the dispositions of resourcefulness, reciprocity and responsibility. They acted as models to other students (Bandura, 1977) (Section 5.5.4.5.3) and maintaining social presence, they made other students feel comfortable in their presence.

5.5.4.5.3 Evidence for the three learner roles model

> *'….in the beginning, I used to stay in Moodle and read only, because most of the students would have already discussed the issue in the forums. Then I thought Moodle was good and I myself started to ask about things in the forum, and after this, I was always checking all threads to see where I could join in a discussion and help the others; this was two way learning, I help others and help myself to understand,..' Sylvia (Crescendo), individual interviews, May 2008.*

The above comment illustrates the processes in the three learner roles model. It is an example where a Crescendo online non-collaborator eventually became a help-seeker and then, a knowledge-mediator. The initial participation of the Crescendo students as online non-collaborators was an opportunity for them to observe what was happening in the VLE. The learners observed other participants and were eventually encouraged to do research, to enquire, and to discuss with the whole-class. Some researchers (Katz and Chard, 1989; Carr 1995; Duncan, Jones and Carr, 2008) claim that learning dispositions are developed by observing others (Section 2.3.1.2).

Claxton (2006) states, that the capacity to learn depends on the will to take risks. The Crescendo students eventually took risks and did not remain pre-occupied by their inhibitions. For instance, Marcus (Section 5.5.4.5.2.b), overcame a fear to post. Another student made the shift from non-collaborator

to help-seeker when she overcame her fear of appearing inferior to other students:

> *'I realised that Anthony and Kate were good people and they will be ready to help in Moodle without looking down on me and saying that I do not know any chemistry': Janina, (Crescendo), in-depth interviews, May 2008.*

In the following comment, a Crescendo learner who was initially a technophobic student explained how the presence of active online participants helped her make the shift from non-collaborator to help-seeker.

> *'Moodle made a big difference to me. It changed many things; it gave me the courage to enquire; the students in this class and the students in my group are with me, also at home. The ones who participate in Moodle make you realise that when you have problems, they are there ready to discuss with you and help you' Marianne (Crescendo), in-depth interviews, May 2008.*

As some of these learners became involved in discussions as help-seekers, they also developed the dispositions of the knowledge-mediators and hence the skills and confidence to help other students

> *'I was encouraged to participate when I asked a question and then someone answered me; afterwards she asked something and I helped her, from then on I was part of the discussion group, ' Lois (Crescendo) in-depth interviews, May 2008.*

The knowledge-mediators acted as models and encouraged the help-seekers to ask in the VLE.

As the shift in roles took place, the learning dispositions in the Crescendo students became robust (Claxton and Carr 2002); once developed, they persisted throughout the course. The Crescendo students developed characteristics similar to the Marcato student. The dispositions also became sophisticated as the students themselves became engaged in strategies which strengthened the disposition. They started new threads and looked for discussions which they could join in, to learn and help others to learn. The VLE offered them a safe place where they tried their skills in researching and solving problems with other students. The knowledge-mediators and the help-seekers contributed to the cognitive, teaching and social presences.

5.6 Conclusion - Part 1

Part I of Chapter 5 addressed sub-research questions 1.2 and 2.1:

1.2 What factors influenced online behaviours in a blended learning context?

2.1 How did online participation change the students as learners?

Part I described the evidence for the existence of factors which affected online participation of an A-level class of chemistry students. They were classified into three main categories of situational, infrastructural and persona-related factors. The factors hindered or facilitated the students' journeys in meeting the three identified online challenges (Fig 5.1). Tables 5.3, 5.4 and 5.5 gave an overview of these factors. The learning dispositions of resourcefulness, resilience, reciprocity and taking responsibility were positive factors which enabled online participation.

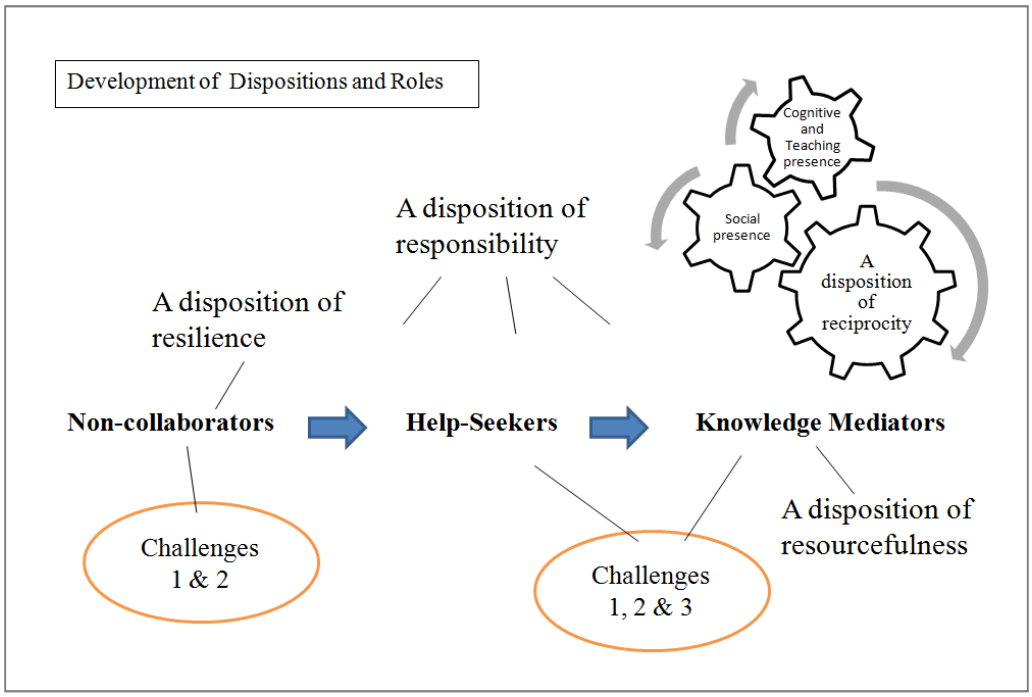

Figure 5.10 The development of online learning dispositions and the three learner roles model

Part I also addressed the research sub-question 2.1, which concerned changes in the students as learners. It showed how the active online participants developed the learning dispositions of resourcefulness, resilience, reciprocity and taking responsibility, took on help-seekers and knowledge-mediator roles and became self-directed and collaborative learners (Figure 5.10).

The Marcato student proved to be an effective leader and a knowledge-mediator. In general, the Ritenuto, the Diminuendo and the Staccato students were not active participants in the VLE due to situational factors arising from the personal life style of the student. The Moderato students were in general affected by persona–related factors, such as lack of self-confidence and shyness and did not take part in whole-class discussions.

The Crescendo students, inhibited by various factors, were initially reluctant to participate in the VLE. As the course progressed, these students demonstrated a change in their online behaviours and with dispositions of responsibility and resilience, they developed desirable learning dispositions of resourcefulness and reciprocity. The Crescendo students were an interesting group of students; they changed roles from online disinterested students or online non-collaborators to help-seekers and knowledge-mediators in whole-class discussions. Thus, the students changed their study patterns and study habits.

The new roles of help-seekers and knowledge-mediators with the underpinning learning dispositions brought about a transformation in the learning identities of the online participants. Part II, focuses on the online behaviour of the Crescendo learners, and illuminates this transformation in learning identities.

Part II – Learning Identities

Part II consists of six sections. Section 5.7 sets the context of Part II. Section 5.8 describes the profiles of two Crescendo students and Section 5.9 discusses the changes in the figured worlds of the Crescendo students. Section 5.10 explains the changes in the learning identities in terms of academic (Stets and Harrod, 2004) and positional identities (Holland et al, 1998; Kasworm, 2005; Allen, 2004) in both the online and in the face-to-face class. Section 5.11 illustrates the new class identity and Section 5.12 concludes chapter 5.

5.7 The impact of online learning on the learners

Part II focuses on the sub-research question 2.2:

2.2 What was the impact of online learning on the learning identity of the learners in the online and in the face-to-face class?

Wenger (1998, p.215) argued that learning transforms 'who we are and what we can do', and therefore it brings a change in identity (Section 2.3.2.4). In Part II, I explore the changes, which online learning brought about in the learning identities of the Crescendo group of learners, as they moved from a figured world of traditional didactic classroom learning to a figured world of online discussion-based learning (Holland et al, 1998: Boaler and Greeno, 2000).

5.8 Two Crescendo students' learning profiles

The in-depth interviews (Section 3.12.6) with the twelve Crescendo students, provided a rich picture of the learning experiences of these students. In Section 5.5.4.2.2, I described the experiences of six Crescendo students to illustrate their disposition of resilience. In the following section I present the identity profiles of two other Crescendo students named Doreen and Paula. These two profiles together with instances from the experiences of other Crescendo students form the basis for the analysis of the transformation of learning identities in Part II. Doreen's profile was selected because, like some other Crescendo students, she was reluctant to use the VLE due to persona-related factors (Figure 5.11). Paula's profile was selected because during the course,

she strongly showed an awareness of her learning identity and a determination to change it for the better.

a. Doreen

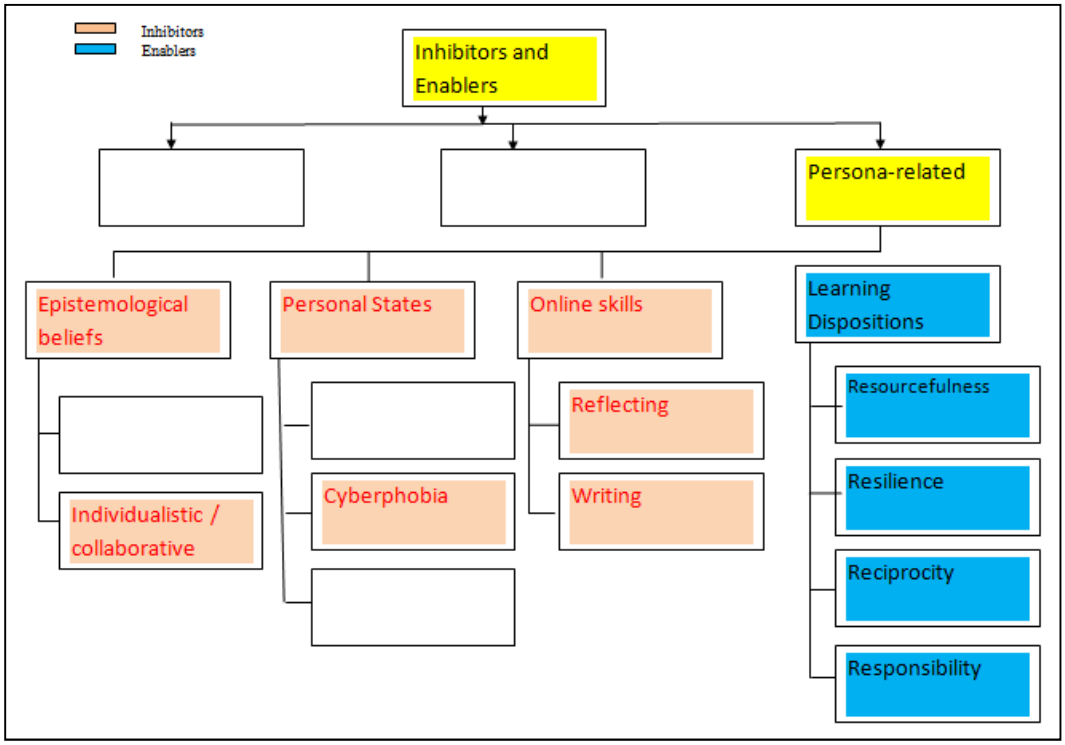

Figure 5.11 The factors which affected Doreen's online participation

Epistemological beliefs, a great reluctance to use the computer and a lack of reflecting and writing skills when using the computer for study were the inhibiting factors which hindered Doreen's online participation (Figure 5.11) in whole-class discussions in the first term.

Table 5.9. An overview of Doreen's online behaviour profile

	Term 1	**Term 2**	**Term 3**
Informal whole-class discussion	Active		
Small group-work	Active		
Formal whole-class discussion	Non-collaborator	Help-seeker	Knowledge-mediator
Challenges (met)	1	1,2 and 3	

Table 5.9 gives an overview of Doreen's behaviour. In brief, Doreen gradually met all three challenges for online learning, i.e., she accepted online learning as a learning method, she eventually used the computer for learning and towards the end of Term 2 and in Term 3, she fully contributed to the online collaborative activities. During all terms, Doreen was an active participant in online informal asynchronous chats and contributed well to small group-work.

In the in-depth interview, Doreen summed up her initial feelings about online learning as having been 'mixed' but generally felt that it was a good idea. In the first week, she expressed in the VLE informal chat area, that 'doing homework in groups and online could be fun'. She had acknowledged the VLE as a medium that would bond the class together and as a place where she could meet the rest of the class. Nonetheless, she was immediately faced with epistemological barriers because she believed that chemistry, being a difficult subject, could only be learnt by listening to the teacher's explanations in the face-to-face class, doing individual class and home work and reading the notes and text book.

In the ice breaker discussions (Section 3.12.4; 4.2.2), Doreen claimed that she had no patience to sit in front of a computer to do study work, for a long period of time. Although, she used msn, emails and a social network frequently, she was reluctant to learn how to use the VLE. Her self-confidence regarding the use of computers for study was very low. She had a desire to do well in chemistry and in consequence, she felt stressed that online activities were part of the chemistry course. She was in a state of conflict; on one hand, she wanted to do well in chemistry and on the other hand, she did not want to use the computer and VLE for study.

Doreen contributed to small group-work in wikis, but was reluctant to participate in whole-class fora, in the first term. She had requested for groups to be student-selected and not teacher-selected. For small group-work, Doreen was in Group 5 (Appendix VIII). She and two other members (the Marcato and a Moderato) in the group ignored the fourth member (a Diminuendo) who did not participate in the VLE in the second and third term. This is in contrast to some students in other groups who complained about non-contributing

members, and consequently they themselves became disinterested in online learning. Doreen stated that in the first weeks, she was unsure of herself and felt inferior to other students in her group. Consequently, she had found it difficult to remark on the work presented by other students in the group. Nevertheless, she claimed that as trust was eventually built within the group, commenting on other members' work became easier.

The Marcato and the Moderato students were a good influence on Doreen. She felt encouraged to change her mode of study and to do research, to work through problem-solving activities and to contribute in her group. Doreen felt a responsibility towards the members of her small group (Section 5.5.4.4.2.a).

Her participation in the VLE made her feel more prepared and engaged in the face-to-face class. She became aware of what was happening in terms of subject content, the level of difficulty, the required tasks, and how she and other learners were managing their understanding of each topic. She was gaining confidence in the subject and she could tell what a topic was about and what it entailed. She realised that it was better to follow a topic in the VLE from the start, where she could participate in all activities with others at the appropriate time, rather than accessing the VLE at the end of a topic. Doreen gradually became used to using the computer for learning and even participated in whole-class discussions.

She became aware that she could improve her learning by taking the initiative to look up issues and make attempts at solving problems especially in areas where she felt weak. She was disappointed with herself at the lack of self-discipline which she sometimes showed and admitted that she could have contributed more in the VLE to improve her learning.

Doreen remarked that without support in chemistry from the VLE, she would have been prone to fall behind in class and then lose confidence in herself. Furthermore, she could use the VLE to revise a topic. Her difficulties in chemistry were similar to those of other students. This was very encouraging as sometimes she even felt she knew as much as or even more chemistry than others in the class. She felt that reading through the work submitted by others increased her self-confidence.

Doreen believed that there were students who were more competent than her and more able to explain and discuss with others. Yet, she was willing to give feedback and acknowledge what others were posting. Although, she was willing to help others, at times she felt uncertain about her knowledge and ability to contribute to discussions.

She valued the fact that she developed a new skill to learn by using computers and a VLE. She was aware that in future she would need this skill. She welcomed the opportunity to be responsible for the learning of others and in that way, she, herself, was also learning. On her own, she would not have felt so responsible and would not have worked so much. Doreen felt that the VLE bonded the class together and stated that this process was important especially in the first term. She looked forward to online learning in the following year.

b. Paula

Situational, epistemological beliefs and personal states were the inhibiting factors which hindered Paula's online participation (Figure 5.12) in the first term.

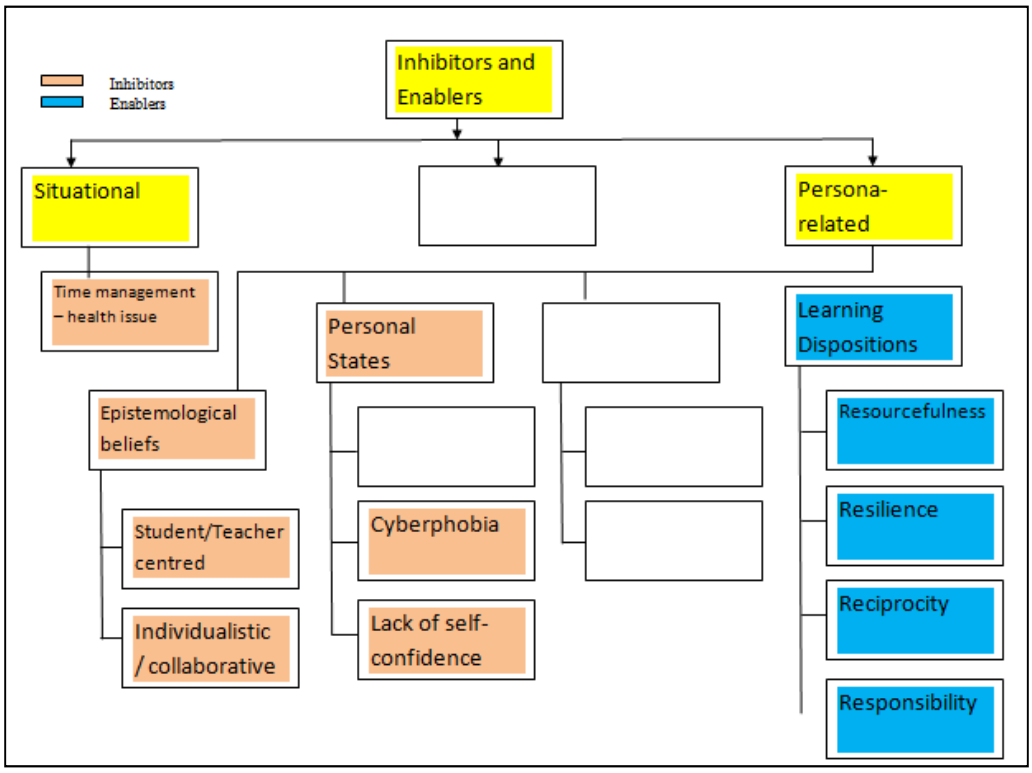

Figure 5.12. The factors which affected Paula's online participation

Table 5.10 gives an overview of Paula's behaviour. In brief, she was inactive in the VLE in Term 1. She took a leading role in small group-work and became a help-seeker and knowledge-mediator in Terms 2 and 3.

Table 5.10. An overview of Paula's behaviour profile

	Term 1	**Term 2**	**Term 3**
Informal whole-class forum	None		
Small group-work	none	Active/leader	
Formal whole-class discussion	none	Non-collaborator - Help-seeker	Help-seeker-Knowledge-mediator
Challenges	none	1, 2, 3	1, 2, 3

Paula was absent from the face-to-face class and missed the first four weeks of the online course due to health problems. On her return to class, she felt that she could not cope with learning chemistry, and was encouraged to use the VLE. She believed that anything to do with computers was 'complicated'. She also found it hard to believe that anything could help her catch up with other students in the class. She believed that chemistry could only be learnt using teacher-centred approaches and individual classroom learning. She was on the point of resigning from the College.

Her close friends, mother and I encouraged her to use the VLE. Paula eventually decided to use the VLE. For small group-work, Paula was in Group 9 (Appendix VIII) with another Crescendo, a Moderato and a Diminuendo student.

Paula compared herself to other students, whom she perceived as knowledgeable, and started the online course with a feeling of weakness in chemistry. She appreciated her friends' support, made an effort to use the VLE and attempted to catch up with the work which she had missed. She gradually became aware of her improvement in chemistry. She worked well in her small group and when she realised that other groups were doing more work than her group, she even assumed a leadership role. She used the VLE for revision work

and worked hard on mathematical problem-solving activities which were her weak areas in chemistry.

In online whole-class discussions, Paula initially held on to traditional expectations, and addressed her postings with chemistry difficulties in the VLE to the teacher. She eventually joined discussions initiated by other students and offered her explanations. She became active in the VLE and developed her way of studying chemistry using the online activities.

Paula observed and consciously imitated other students who were active in the VLE. She positioned herself in contrast to others and asked herself why she could not be like them. This made her work harder.

Paula revealed her satisfaction that other students who got to know her through the VLE, were asking for her opinion regarding chemistry concepts in the VLE, in the face-to-face class and in the laboratory. She felt that her opinions were being valued by others, and that she was being considered as one of the 'knowledgeable' students who could offer help and was capable of discussing chemistry issues in both the online environment and in the face-to-face class. This made her feel that she was 'somebody' in the class and gave her a great sense of belonging.

5.9 The two figured worlds

These two narratives (Section 5.8) portrayed the learning profiles of two learners, who like other Crescendo students experienced a transformation in their learning approach. In this section, these transformations are recounted with reference to a social system consisting of figured worlds. Holland et al (1998) describe figured worlds (Section 2.3.2.5) as places where actors come together to construct joint meanings and activities:

> By figured worlds then, we mean a socially and culturally constructed realms of interpretation in which particular characters and actors are recognized, significance is assigned to certain acts, and particular outcomes are valued over others.
>
> Holland et al, 1998, p. 52

During the first four weeks of the academic year, before the start of the online learning phase, Doreen, Paula and the other students were constructing a

figured world of didactic learning based on their experiences of traditional didactic learning practices from previous years. The learners or actors in this familiar figured world were finding their positions through their actions of listening, observing, reading and doing individual work in the face-to-face class. As experienced actors in such a world, the students knew their roles and were aware of the negative and positive forces which could affect their participation in the world of learning chemistry. This figured world centred on 'structured, individualised and ritualized learning' (Boaler et al, 2000, p178). In this figured world, chemistry was visualized by Doreen and some other students as a difficult subject, which could only be learnt in traditional ways (Section 4.2.2.1). Several students expected 'a good set of notes' or 'teacher's handouts' (Section 5.5.1.1). For some students in this class, such as Doreen and Paula, computers and Internet sites were generally considered as complicated or tedious, to use for study purposes (Section 5.5.2.1), and collaborative learning was not perceived as effective or efficient for learning as traditional individualised learning (Section 5.5.1.2). The actors in this figured world tended to succumb to passive learning in the face-to-face classroom.

The online participants were the actors in the new figured world of online collaborative learning. They gradually developed new identities in relation to the new figured worlds (Holland et al, 1998; Wenger, 1998). The traditional learning identities formed in an 'ecology of didactic-based learning' were transformed to new learning identities in 'an ecology of discussion-based learning' (Boaler and Greeno, 2000, p.177). In the latter, the actors were empowered to become agents taking control of their learning. They took on new roles and participated in innovative activities where being resourceful, reciprocating and taking responsibility for learning became significant meaningful acts of participation and socialisation in this new world. These acts involved research, reflection, discussion and supporting other students. There is evidence in this study that as agents in this new figured world, the students were enabled to develop their potential as learners in both the online and the face-to-face class.

Table 5.11 Main differences between the two figured worlds

Figured world	**Ecology**	**Meaningful acts**	
Face-to face	Didactic learning	Individualised learning	listening to lectures, reading, observation, drill and practice
Primarily online (plus face-to-face)	Discussion-based learning in the online class	Self-directed and collaborative learning	researching, reflection, discussion and supporting other students

Table 5.11 lists the differences between the figured world of didactic based learning and that of discussion-based learning. The factors which were discussed in Part 1 were forces that shaped the new world of online participation. All twelve Crescendo students were resilient and took time to develop mastery as actors within the new world. They changed roles from passive non-online learners to online non-collaborators to help-seekers and to knowledge-mediators.

The following sections focus on the new learning identity which the students developed through their participation in the new figured world of discussion-based learning.

5.10 The new learning identity

In the literature, identity has been discussed from several aspects (Section 2.3.2.1), e.g., personal identity, social identity (Tayfel and Turner, 1979, Caughey, 2008), friendly identity, work identity, academic identity (Stets and Harrod, 2004), positional identity, relational identity (Holland et al, 1998; Solomon, 2007; Kasworm, 2009) and participation identity (Solomon, 2007) and has been described as multiple (Sfard and Prusak, 2005), multi-layered (Kasworm, 2009) and multi-faceted (Moingeon and Soenen, 2002).

Stets and Harrod (2004, p156) define identity as ‘a set of meanings attached to the self’. Identity may take the form of different interpretations (Section 2.3.2.1) depending on whether ‘the meanings’ attached to the person stem from the individual, or are attributed to the individual by other persons, or are

recounted by a person to a third person about an individual (Sfard and Prusak, 2005). The learning identity is viewed as a dynamic process (Sfard and Prusak, 2005; Massey, 2005) which is constantly being renegotiated (Wenger, 1998; Holland et al, 1998).

The learning identities under discussion are the subjective or self-assigned learning identities of the Crescendo students, which emerged from narrations in the in-depth interviews. The students constructed new subjective learning identities when they took part in online activities (Gustafson, Hodgson and Tickner, 2004), and they confirmed these identities when they talked about themselves in the individual interviews (Holland et al, 1998; Sfard and Prusak, 2005). With reference to the notion of a multi-faceted identity, it is argued that a subjective identity may be influenced by other facets of identity (Moingeon and Soenen, 2002; Sfard and Prusak, 2005), such as:

- the attributed identity, i.e., the way, a student is seen by others;
- the designated identity, i.e., the identity which a student would like to have in the future;
- the projected identity, i.e., the way, a student would like to be seen by others.

Owing to the double hermeneutic process in this study (Section 3.11.6), the subjective identity discussed in these sections may have been influenced to some extent by an attributed identity - my interpretations of the subjective identity as narrated by the student. As the researcher, I did my utmost to distinguish, understand and figure out the different forms of identities in the narrations given by each Crescendo student.

Online learning provided opportunities for the development of online learning dispositions which shaped the new learning identities (Deaken, Crick and Yu, 2008). This study gives evidence of the transformations in learning identities, which occurred as the Crescendo students moved from a figured world of didactic learning to a new figured world of discussion-based learning in a blended learning setting. The student's learning identity in the context of this study is discussed from two aspects: an academic identity (Section 5.10.1) and a positional identity (Section 5.10.2). These two dynamic learning sub-

identities, which have been transformed by the online learning dispositions, co-existed and influenced each other (Section 5.10.3).

In the context of this study, the academic identity relates to aspects of mastery of the subject content, tools and approach to learning. It also relates to the students' choices and empowerment in their learning. The positional identity is the students' individual stance with respect to their persona-related characteristics, their acted position and the perception of their social standing in the community.

Figure 5.13 gives an overview of the transformation in the learning identity of the online learners. The learning identity prior to the start of the online component of the course is denoted as Student Learning identity 1 and it is discussed as Academic identity 1 and Positional identity 1. These identities, constructed in a previous world of traditional didactic learning were transformed to a new Student Learning identity 2 consisting of Academic identity 2 and Positional identity 2. The new Student Learning identity 2 is the merging of the developing online identity with the face-to-face class identity which has been influenced by the developing online identity. Sections 5.10.1 and 5.10.2 describe the transformations of the academic and the positional identities.

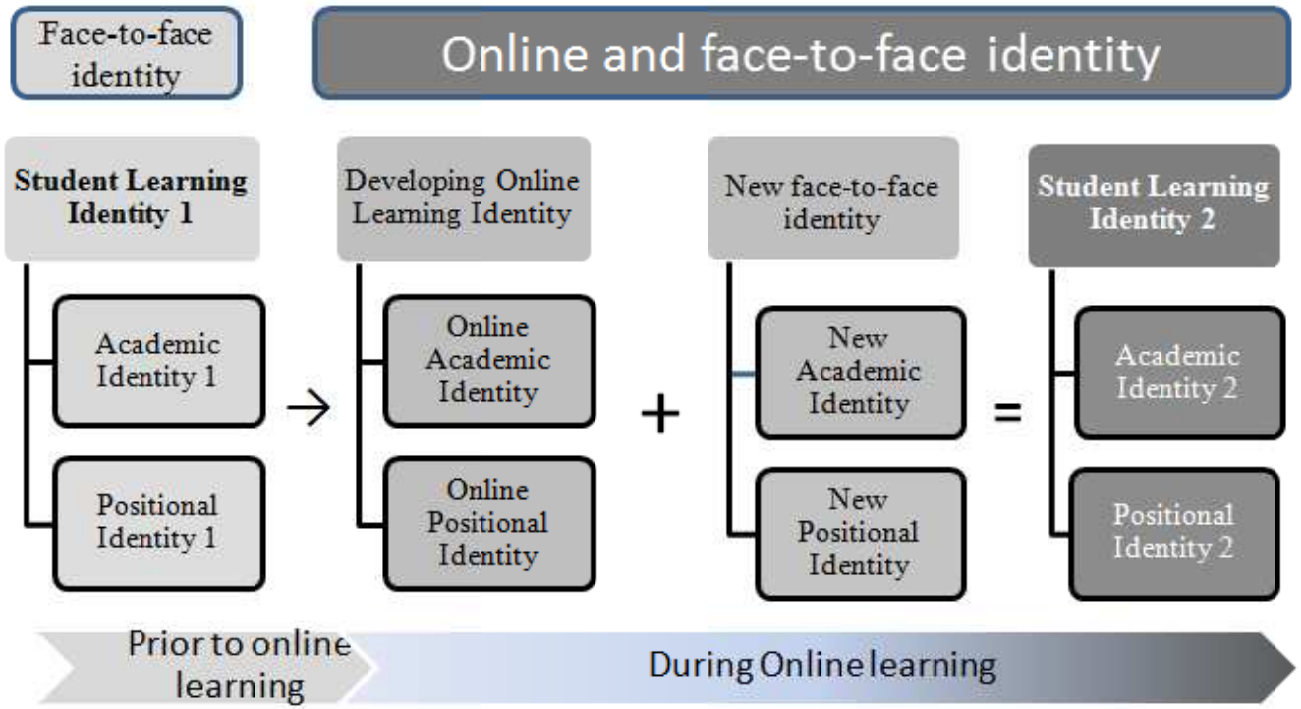

Figure 5.13. The transformation in the student learning identity

5.10.1 The transformation of the Academic Identity

Stets and Harrod (2004, p159) view academic identity through performances which 'reveal meanings of competence, power, and agency'. Competence is the acquisition of intellectual, physical and interpersonal skills. Agency is the ability to give direction to the course of an individual's life (Biesta and Tedder, 2006). It is indicated when an individual makes conscious choices (Stets and Harrods, 2004). Power is indicated by the authority and the enablement which a person gains and exercises (Stets and Harrods, 2004). In this study, academic identity 1 changed from one reflecting a passive-learner, based on received knowledge (Belenky et al, 1986) and an individualistic learning approach, to a new Academic identity 2 depicting an active learner, involved in self-directed and collaborative learning.

In this study, the elements of competence, power and agency have been selected as the indicators to show the transformation in the academic identity (Figure 5.14). These three elements complement and re-enforce each other.

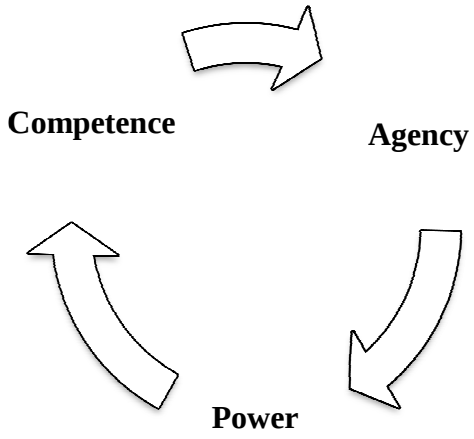

Figure 5.14: The three elements depicting an academic identity

In the new figured world of discussion-based learning, the learners:

- became **competent** in the use of e-tools and in the subject content and developed self-directed and collaborative learning skills;
- developed **agency** and were able to make choices regarding their learning of the content and their learning methods;

- were **empowered** to take responsibility for learning, research, discuss, seek help, mediate learning to other students, develop agency and assess their learning in both the online and the face-to-face environments.

The development of learning dispositions of resourcefulness, resilience, reciprocity and responsibility (Section 5.5.4) shaped the new academic identity because these dispositions resulted in an increase in competence and in the development of agency and empowerment.

5.10.1.1 Competence

The individual interviews which took place after the seven-month blended course gave evidence of an increase in competence in

- the use of the computer and the VLE for study;
- the use of the Internet for research;
- engaging in self-directed and collaborative learning;
- the subject matter, especially areas which were usually problematic for the student.

The disposition of taking responsibility for learning is fundamental and its presence is shown also by the indicators of other dispositions. The disposition of resourcefulness was instrumental for the learners to be academically curious, flexible and have confidence in their learning using the Internet and books for research, the discussion fora and the wikis to learn from each other. They became self-directed learners. With a disposition of reciprocity they became collaborators. With a disposition of resilience, the students persisted through their uncertainties regarding online learning and also in their problem solving tasks to become competent in areas of chemistry, especially those which were problematic.

The following exemplars illustrate increased competencies.

i. Use of the computer, VLE and Internet for research

Seven out of the twelve Crescendo students were reluctant to use computers to study chemistry and five of these were technophobic (Section 5.5.2.1). Doreen was unable to use the computer for study:

> *'I went bizarre 'fernezija' when I sat in front of the computer to do the work. I could not work on the computer for a length of time. I had to do the work somewhere else and then go back to the computer,' Doreen, (Crescendo), in-depth interviews, May 2008.*

Two Crescendo students had declared a fear of navigating through the site and five other students preferred to use pen and paper to using the keyboard as they found the latter tedious to use and time consuming. Nevertheless, these Crescendo students developed dispositions of taking responsibility for their learning, of resilience and of resourcefulness, and participated in the VLE.

> *'Moodle showed me that I have to be the one who has to show interest to learn and look up things which I do not know. You cannot find everything in the textbook. You cannot rely on the book only. I am now aware that learning is not just reading the book,' Doreen, Crescendo, in-depth interviews, May 2008.*

They transformed their academic identity by becoming more skillful and competent in the use of learning resources and tools such as the computer, the VLE and the Internet.

ii. Ability to collaborate and be a self-directed learner

The students in the class had either little experience or no experience at all of group-work (Section 5.5.1.2); they had to learn how to learn collaboratively. Four out of the twelve Crescendo students stated that they preferred to work individually to working in groups. These Crescendo students gradually developed the dispositions of resourcefulness and reciprocity and became competent to discuss issues and share their knowledge in both small group-work and large group online discussions.

> *'We meet during a free lesson and divide the work between us five. We do our work using books and the Internet or ask each other through msn or at the College. Then each one posts the work in the*

> *wiki and we check each others' work and add in comments. Then we decide on some sections and reach an agreement on what to choose as the best answer,' Jodie, (Crescendo) individual interviews, May 2008*

In the next comment Doreen, who had thought that chemistry was not a subject which could be learnt through group-work, shows that she became capable of learning through discussion in the forum.

> *'In Moodle, I inquire and become determined to work through what I do not know with other students in the forum,' Doreen, Crescendo, in-depth interviews, May 2008.*

These learners developed online learning dispositions, took on the roles of help-seekers and knowledge-mediators and became competent as self-directed and collaborative learners.

iii. Engagement with subject content

The online learning dispositions were instrumental for the Crescendo students to engage with subject content. Paula was on the verge of resigning from the College on account of her perception of her poor progress in chemistry. She and six other Crescendo students used the VLE primarily to improve their mathematical problem-solving questions in chemistry.

> *'I used to write on the back of my notebook that I wanted to do a certain number of problems, e.g., from 1 to 5…At times, without realising, I worked out more problems than I had planned,' Paula (Crescendo), in-depth interviews, May 2008.*

Due to their dispositions of resilience in solving problems and the gain of confidence in themselves and in the learning design, the Crescendo students became able to engage with subject content. Working through problem-solving tasks gave them a sense of achievement.

The competence gained in the subject matter and learning skills such as online collaborative and self-directed learning constituted a change in the academic identity 1 and this affected the student's learning identity in the face-to-face environment. The gain in competence brought about an increase in self-confidence. The students became motivated to collaborate and this led to the

building of the learning community in both the online and face-to-face learning environments.

5.10.1.2 Agency

In this study, agency was shown when the students made conscious choices (Shaw, 1999 cited in Kasworm, 2009, Biesta and Tedder, 2006) regarding their learning and in effect, were able to take control of their learning. The online participants, in particular the Marcato and eventually the Crescendo students chose:

- how to learn;
- what to learn;
- when to learn.

In the figured world of didactic learning in the face-to-face class, the students were in general, passive learners and learnt what the teacher wanted to teach them. Boaler and Greeno (2000, p181) argue that the learners in a didactic world give up having their own thoughts and 'are restricted in the application of selves, and their ideas, inventiveness and general agency do not appear to be valued'. They are not involved in generating questions or ideas in a community of participation. The students' dispositions to take responsibility to manage their learning and to take responsibility for the learning of others was a prime contributor to the development of agency and hence, a change in the academic identity.

i. How to learn

Doreen and other Crescendo students had believed that chemistry is learnt through a passive and individualistic approach, by acquiring knowledge from the teacher during lectures, the teacher's notes and the textbook. These students were receivers of 'predetermined knowledge that appeared unavailable for discussion or negotiation' (Boaler and Greeno, 2000, p.179).

> *'I preferred to have the notes there and I study from them. Doing research was tedious,' Doreen (Crescendo), in-depth interviews, May 2008.*

> *'I am used to having a good set of notes from the teacher and I just study them well for the exams,' Sylvia (Crescendo), in-depth interviews, May 2008.*

Thus, academic identity 1 which existed prior to the start of the blended course, was constructed around an epistemology of received knowing, where the students considered knowledge 'as primarily dependent on and derivative from an authoritive source', other than themselves (Boaler and Greeno, 2000, p.174).

The Crescendo students changed from a state of 'acquiescence' (Phillips Manke, 1997, p.3), 'obedience and compliance' (Boaler and Greeno, 2000 p184) in a figured world of face-to-face didactic learning to active learners with roles of help-seekers and knowledge-mediators in a figured world of online participation where with the underpinning online learning dispositions they developed agency.

Some Crescendo students observed other students, and developed the confidence to ask when they felt the need to do so.

> *'I used to give up easily, when I did not know how to solve the problem, Now, I tell myself: let me try. If I do not manage to solve it, I discuss it with the others, instead of feeling down and stop studying chemistry,' Paula (Crescendo), in-depth interviews, May 2008.*

The response, shown by other learners, encouraged the help-seekers to participate more in the VLE. The satisfaction in participation, which is shown in the next comment, resulted in further participation.

> *'it all started when I asked a question; Sylvia responded to my question and then I posted an answer to her question. From then on I was reading all threads and discussing with others,' Lois, Crescendo, focus group meeting, April 2008.*

These Crescendo students moved from 'received knowing' to 'connected knowing' which is

> knowledge being constructed in interaction with other people in a process that depends on understanding others' experiences, perspectives and reasoning, and incorporates this understanding into the individual's knowing and understanding,
>
> Boaler and Greeno, 2000, p.174.

As the Crescendo students developed agency, they were able to change their ways of study and to make choices about their learning.

> *'Moodle changed the way I studied. Through Moodle I developed an interest in looking up things that I did not understand. If I do not solve the problem, I knew I could discuss in Moodle,' Doreen (Crescendo), in-depth interviews, May 2008.*

The next comment illustrates how a Crescendo student visualized the change from 'textbook and teacher's notes' to 'online learning':

> *'All of a sudden instead of having just a book and notes, I can see how someone else is solving a problem. I say to myself: 'she is doing it this way'. This is better than any other study. Better than having a book, because in Moodle I am with something living,' Marianne, Crescendo, in-depth interviews, May 2008.*

ii. What and When to learn

Through the online medium, students were given the opportunity to gain agency over what they needed to learn in a chemistry topic and how much time they could spend on the topic. They chose their way forward through the course, by working on activities which were relevant to their learning.

> *'With Moodle, I was encouraged to work out more problems. I was at a loss working out the mathematical ones like gases and equilibria ,I would not have studied so much chemistry without Moodle,' Jodie (Crescendo), in-depth interviews, May 2008.*

> *'I used Moodle a lot for the maths.... I did not feel the need for extra work in bonding. But now looking back, I'll save them all and work through them maybe in summer or for the exam,' Naomi (Crescendo), in-depth interviews, May 2008.*

As students developed agency, they became less reliant on the teacher for their learning. This was an opportunity for them to realise that their performance was a direct result of their effort (Section 2.2.5.1.iii).

> *'Looking back at all the work in Moodle, I can say that we students did all this. It is all our work. We worked our way through it. It is still there to be used for revision. I would not have learnt so much and worked so hard, without Moodle.' Janina (Crescendo), in-depth interviews, May 2008.*

As knowledge-mediators helping other students, the Crescendo students clarified their understanding, filled in the gaps in their understanding, internalized and developed new perspectives and understandings (Webb, 2008). As help-seekers, they engaged in understanding, identified misconceptions, filled in the gaps in their understanding and constructed new knowledge (Webb, 2008).

5.10.1.3 Power

Power is indicated by the authority and the enablement which a person gains and exercises. As learners developed the online learning disposition to take responsibility to manage their learning and the learning of others, they became empowered to act in new ways. The online learners were empowered to take responsibility and develop agency. In these processes, they were empowered to:

- research;
- engage with content and to tackle more work;
- discuss, enquire and share knowledge;
- assess their learning;
- teach and support each other;

The Crescendo students felt empowered to do more work in the VLE because they felt that their learning was improving and gaining confidence, they tackled more work.

> *'…..Even the questions in the exam past papers which we were discussing in Moodle helped a lot - I was understanding them better. I felt confident to tackle more questions in past papers,' Kate (Crescendo), in-depth interviews, May 2008.*

Other students were empowered to do more work because they felt encouraged by their peers or felt a responsibility for the learning of other students (Section 5.5.4.4.2).

> *'you forget you are at home on your own; you are revising with someone else; not with books and notes; time flies, you learn more; you feel you are not studying on your own – there are others with you encouraging you to study,' Marcus (Crescendo) ,in-depth interviews, May 2008.*

'In Moodle you work more, you do the work for yourself and the group,' Doreen (Crescendo), in-depth interviews, May 2008.

'I involved myself even more by taking part in whole-class discussions. This made me feel more active and part of the community', Sylvia (Crescendo), in-depth interviews, May 2008

Learners felt empowered to attempt and discuss problem-solving tasks in the VLE.

'I do no longer feel down because I do not know how to work out the problems. I convinced myself to ask once and had a reply from the others. Now, even when I do not know how to solve a problem, I try to do it, and if I do not manage, I discuss it in Moodle,' Paula (Crescendo), in-depth interviews, May 2008

Learners showed a move towards becoming more active in their learning process; they became able to assess their learning and be aware of the concepts which they did not understand.

'I would know what a topic entails and that there are not things which I do not know about. I'll be sure that I would have covered all concepts in a topic,' Doreen, (Crescendo), in-depth interviews, May 2008.

Doreen like other Crescendo students became able to assess her own learning. As she became more engaged with chemistry content, she could identify her strengths and weaknesses in the subject. In a figured world of discussion-based learning, the students felt empowered to take an active part in problem-solving activities, where they sought help and helped others. These students developed the authority to perform actions which they did not exercise in the previous figured worlds of didactic learning.

5.10.2 The transformation of the Positional Identity

The positional identity of a student in this class related to the way the students understood their position and acted out their position in the class (Allen, 2004). It was indicated by the way the student behaved and how this behaviour fitted in the learning community.

The positional identity concerned the following questions:

- what is the student's stance regarding learning (beliefs, dispositions)?;
- which learning roles does the student perform (acting)?;
- where does the student fit in the community?;
- where does the student perceive themself to stand in comparison to other learners?;
- how does the student perceive other students to see him or her as a member of this class?

This section shows that the development of the online learning dispositions resulted in the transformation of the positional identity 1 constructed in a figured world of didactic learning to a new positional identity 2 constructed in a figured world of online discussion-based participation. The evidence for transformation of positional identities emerged from the individual interviews with the students.

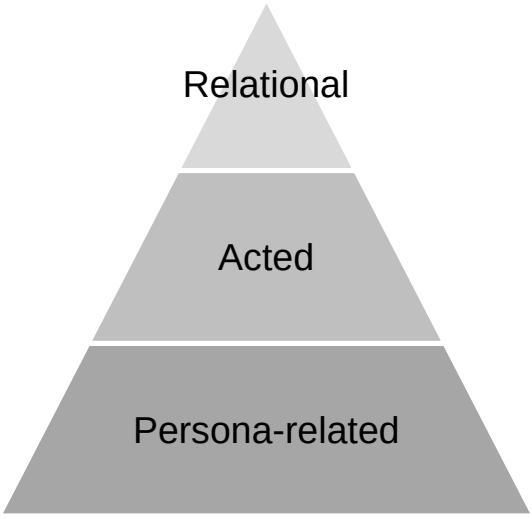

Figure 5.15 The three layers of the Positional Identity of a learner

The positional identity of each learner is visualized as multilayered (Kasworm, 2005). This study has revealed three layers which build on each other (Figure 5.15). The first layer is based on the student persona-related characteristics regarding learning. This is the internal make-up of the student including the student's views, beliefs, characteristics and dispositions regarding learning, (see Section 5.5). The second layer is the acted position of the student as

influenced by the student persona regarding learning. For example, the online learning dispositions in the first layer, gave rise to acted roles of help-seekers and knowledge-mediators in the second layer. The acted positional identity is expressed as the student behaviour in the online and the face-to-face class, and is indicated by the students' behaviours and their roles. This second layer affects the third layer which is the relational positional identity. This involves a comparison of the acted positional identity of the self to the perceived positional identities of other students. This may be influenced by how students perceived other students to see them. This study shows that in some instances, the development of relational positional identities results in learning.

The three layers of the positional identity are discussed in the next sections.

5.10.2.1 A Persona-related Positional identity

The persona-related positional identity of the Crescendo students at the beginning of the blended course was one constructed by:

- traditional learning beliefs where students believed in teacher-centred approaches (5) and individualistic learning (5);
- elements of shyness (5);
- a lack of self-confidence to use the computer for learning (5);
- a lack of self-confidence to discuss in the face-to-face class and in the online setting (6);
- a lack of learning dispositions essential for online collaborative learning.

However, as the Crescendo students overcame their problems with online participation, they gradually developed online learning dispositions and changed their epistemological beliefs to take on a new persona positional learning identity favouring learner-centred and collaborative learning.

This study has evidence that the Crescendo students changed their epistemological beliefs favouring learner-centred approaches and collaborative learning over teacher-centred and individual learning. In Term 1, Paula had requested handouts and model answers (Section 5.5.1.1). With a disposition of

resilience, she persisted in attempting online activities and was successful in using the VLE to improve her learning.

> *'Moodle surely changed the way I study the topics with a lot of maths; before when I used to come across numerical problems with a lot of words, I got discouraged; now, I can work and discuss the problems with my friends,' Paula (Crescendo), in-depth interviews, May 2008.*

As Crescendo students became aware of the benefits of self-directed and collaborative learning, their beliefs shifted towards socio-constructive approaches:

> *'Studying from the notes or textbook is a lonesome experience. Moodle was something living, I was able to see the work of other students, to see what they think and this was encouraging. They give you the push to research and do the work. You do it for yourself and to share with them,' Marianne (Crescendo), in-depth interviews, May 2008.*

The Crescendo students developed a new persona positional identity when they participated in the online course.

5.10.2.2 An acted positional identity

This layer of the positional identity reveals how students with newly developed learning dispositions understood and acted out their roles. An overall transformation in the acted position is the change in the Crescendo students from passive learners in the face-to-face class to self-directed and collaborative learners. These new roles were manifested as roles of help-seekers and knowledge-mediators. The acted positional identity of five Crescendo students prior to their participation in the VLE was that of passive and shy students. For example Marcus did not participate in class, waited for others to ask and respond in the VLE in the first term.

> *'I never asked in class. I was too shy. Even in the first term in Moodle I waited for other students to ask….I also waited for others to reply. My difficulty was then solved. This worked out well for me,' Marcus (Crescendo), in-depth interview May 2008.*

Marcus contrasted his former quiet and shy acted position in both the online and face-to-face class settings with his new acted position. In the latter, with a disposition of reciprocity, he interacted with other students.

> *'Because of Moodle I made a huge step; In class, I talk to everyone who is in Moodle. Without Moodle chemistry would have been more difficult. Now, it is like you are talking to someone else; you are not alone at home. You are sharing with others and revising with them; then you talk to them again in class,' Marcus (Crescendo), in-depth interview May 2008.*

Marianne had an acted positional identity of a passive and anxious learner because she feared that using the VLE might cause deletions of the content. She thought it was safer to read e-mail copies of the ongoing discussions. Developing a learning disposition of resilience and reciprocity, she experienced a change in her acted positional identity; she desperately needed support with her work and became a help-seeker. This new acted position of participation was reinforced when she joined an enthusiastic small group who encouraged her to participate more in the VLE. In turn, her participation in both small group-work and whole-class discussions made her feel part of the learning community.

> *'…I gradually approached another group. They are all very helpful…Moodle made a difference to my ways of study. It changed many things. It provided me with the courage to ask. Students, who work earnestly, encourage you to ask when you have problems….. My former friends were not much interested in sharing (learning)….. I feel now that the class and the friends I have, especially the members of this group, are also with me when I am studying at home,' Marianne (Crescendo), in-depth interview May 2008.*

Another student expressed her former acted positional identity of a non-interactive and shy online learner in the following manner:

> *'I printed out email copies of discussions and then read them on the bus. I did not discuss in Moodle because I did not feel at ease. I was scared I would say things which were obviously stupid. In many cases the questions which other students asked, were also my difficulties. I would not know how to answer, and even if I do, I am afraid that the others will not understand me,' Janina (Crescendo), in-depth interview May 2008.*

This acted positional identity changed when the student realised that the VLE was a safe medium where she could express herself.

> *'Now that I got to know Anthony and Kate, it feels different. I am posting in the forum. These students are 'all right' (good natured).*

They do not look down on me and say that I do not know any chemistry,' Janina (Crescendo), in-depth interview May 2008.

The changes in the acted positional identity entailed shifts from passive-learners in the class or non-collaborators in the VLE, to active learners with roles of help-seekers or knowledge-mediators in the VLE. As seen from the above examples, circumstances such as: could not wait for others to ask, a desperate need for support, change of group, and getting to know that knowledgeable students are kind, triggered a change which together with the underpinning learning dispositions led to a new acted positional identity of asking, discussing and collaborating in the VLE.

5.10.2.3 A relational positional identity

In this research context, the concept of a positional identity is extended to a relational identity. Relational identity refers to how students, aware of their acted positional identities and those of their classmates, visualise themselves in relation to their classmates (Kasworm, 2005; Allen, 2004; Solomon, 2007; Holland et al, 1998). Prior to the start of the online course, the students did not have enough time to get to know each other and to construct a relational identity in the face-to-face class. However, this would have developed slowly as students, in the teacherial, practical and lecture sessions, gradually became aware of each other's positional identities. In the individual interviews, some students remarked that in the online medium, they could watch other students learn (Section 5.5.4.3.1). The online medium facilitated the construction of relational positional identities. Students, who related their positions to that of others, had a perception of the academic (competence) and the acted positional identities of themselves and of other students (Stets and Harrod, 2004; Allen 2004; Gustafson, Hodgson and Tickner, 2004). Some students had a perception of how other students see them in the learning community. The relational identities which emerged and are discussed in this study resulted in learning.

This section discusses relational identity with reference to the Crescendo student, Paula (Section 5.8.2). Paula missed the first weeks of the online course, and on her return, she compared her acted positional identity to that of other students. This resulted in a feeling of weakness in chemistry, and loss of

hope in catching up with the rest of the class. This was aggravated by a lack of confidence in using computers (Section 5.5.2.1). This relational positional identity affected her potential to learn and she even considered resigning from College.

Paula received great encouragement from her friends, her mother and her teacher (myself). As Paula became aware that other students were learning from the VLE activities, she became resilient and with a great effort, she sought support for her studies from activities in the VLE.

> *'….when we started the topics with lots of maths, you had told us that there is great help in Moodle. I became determined to use it because just by listening in class, I was not learning as much as the others, who were doing Moodle,' Paula, (Crescendo), in-depth interviews, May 2008.*

Her mathematical skills improved and hence her academic learning identity changed as she became competent in solving mathematical chemistry problems.

During the course, Paula, was constantly monitoring her position in class in relation to others. She was continuously attempting to close the gap between her acted learning positional identity and her perceived acted positional identity of the more knowledgeable students. Furthermore, her long-term designated identity (Sfard and Prusak, 2005) of becoming an ophthalmologist formed part of the relational identity towards her future self. This also motivated her to participate and contribute in the VLE.

> *'I feared that if I continue in this way, I'll never make it to medical school. I intend to become an ophthalmologist. I realised that if I do not do something I'll not succeed. So I started – a few online activities at a time,' Paula (Crescendo student), in-depth interviews, May 2008.*

She compared herself to other students and believed that other students never seemed to get discouraged.

> *'I used to get discouraged very easily. I used to wonder how it is that there are students who keep on going and I get discouraged,' Paula (Crescendo student), in-depth interviews, May 2008.*

However, the awareness of her changing positional acted identity in relation to others kept Paula motivated and working hard. She was also willing to imitate other students whom she perceived as more knowledgeable and hard working in the VLE

> *'…I watched the others work hard and participate, especially Kate and Anthony. I used to tell myself, 'why should I not do so as well?' These students find the time to do this work and they are good in chemistry…," Paula, (Crescendo), in-depth interviews, May 2008*

Paula, developed a disposition to take responsibility for learning. She even compared the work of her small group with that of other groups, and took the role of a leader when she realised that other groups were doing more work:

> *'We used to agree to meet, but, each time, we postponed the meeting. Then, I took over the lead and started the work. I used to see the work of other groups in the wikis and used to say to myself that if we keep on postponing our discussions, we'll not get the work done. I took over because the other groups were doing more work than us,' Paula (Crescendo student), in-depth interviews, May 2008..*

Paula also appreciated that her opinion and work were being valued by her peers in her small group. This was a positive move for a student who, in the first term, needed encouragement from her friends. This aspect of the learning identity is explained by Chickering and Reisser's (1993) vector 3; she moved from dependence through autonomy towards interdependence, where she developed both emotional and instrumental independence (Section 2.3.2.2).

> *'My friends used to ask me whether I did something. Then they see my work, we discuss it and continue from there.,' Paula (Crescendo), in-depth interviews, May 2008.*

Paula held the three roles in the three learners roles model (Section 5.5.4.5.1). In her non-collaborator role in whole-class discussions, she watched other students learn and reflected on her situation in relation to them. In the first two terms, she had believed that the knowledgeable students knew all the chemistry and that, unlike her, did not make mistakes when discussing online.

> *'The focus group was an eye opener. I listened attentively to the others, especially Kate and Anthony. I was encouraged by what they said. They do sometimes make mistakes and there are things*

that they sometimes do not know eheheh!' Paula, (Crescendo), in-depth interviews, May 2008.

Once more her relational identity and willingness to imitate significant others motivated her to contribute fully in whole-class discussions. This immediately brought benefits to Paula in terms of learning. She was assessing her own learning as she attempted to discuss and solve problems in the VLE with other students.

'I do no longer feel down because I do not know anything in chemistry. I try to do the work on my own. If I have a problem, I look up what the others did in Moodle, and if I do not find it, I start a discussion; I often end up helping others in other fora. As Kate and Anthony had said, when you try to solve problems for others, you realise what you know or do not know.,' Paula, (Crescendo), in-depth interviews, May 2008.

She also became aware of possessing a new positional relational identity in both the online and the face-to-face environment. Moreover, a student whom she considered as one of the most knowledgeable in the class was asking her for her opinion during the face-to-face class and laboratory sessions.

'Before, no one used to ask for my opinion in class. I do not mean that now I know everything. In class or in the lab, Kate sometimes asks me -'Paula, what answers did you get'? or 'Which method are you using?'; Now I feel more that I am part of the class. At least now, there are ones who would like to know what I think and discuss solutions with me, and this happens, not only online. I made an improvement. I am no longer the one always asking others. Now they ask me as well and consider my opinion. We compare results in the lab…I discuss with them in Moodle and they know now that I am interested in chemistry,' Paula, (Crescendo), in-depth interviews, May 2008

This section illustrated the effect of the relational learning identity on learning for one of the Crescendo students. This student started the course 'feeling down' and 'being weak' in chemistry, but at the end of the blended course, she felt her opinions were valued by others and that she was an active significant member of the learning community. She managed to narrow the gap between her perceived positional identity of herself and that of the students whom she observed and strived to imitate.

Paula's newly formed academic and positional learning identities in the new figured world of discussion-based learning and online participation resulted in learning. With the development of new learning dispositions, she was able to transform her academic identity with respect to developing competence, agency and power and also her positional identity as she experienced changes in her persona identity and her acted positional identity. She was conscious of her relational identity, and used this as a strategy to improve her learning.

The above sections showed that the online learning dispositions were enablers for online participation and the means to shape both the academic and positional identities of the Crescendo students. In the first term, the Marcato student and two Crescendo students were positioned as the knowledgeable students in the class. These students were the knowledge-mediators who were always ready to help others in the online setting. For these students, this positional identity was also transferred to the face-to-face environment (Section 5.10.4). Although a few examples were quoted in this section, it is important to note that awareness of the relational identity existed and this in some cases gave rise to learning. The development of relational identities in the course contributed to learning as students sought help and imitated the students whom they perceived as more knowledgeable than themselves. In this way, they worked hard to narrow the gap between the acted positional identities of themselves and those of other learners.

5.10.3 The sub-identities influence each other

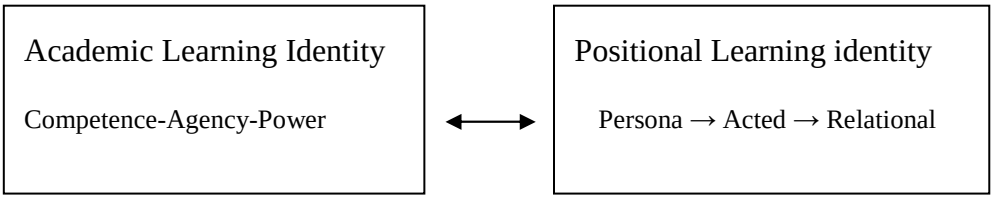

Figure 5.16. The influence of the academic identity on the positional identity and vice-versa

The students developed new persona positional identities when they changed their epistemological beliefs and developed new online learning dispositions.

This influenced the academic identity as they became more competent in subject content, use of tools and new learning skills. They also developed agency and became empowered to take responsibility for their learning and the learning of others. This gave them a new acted identity with roles of help-seekers and knowledge-mediators and the students formed new relational identities. In turn, this affected the academic identity, where students experienced further competence, and a re-enforcement in agency and empowerment. In this iterative way the transformation of the learning identities enhanced their learning.

5.10.4 Transformation in the face-to-face class

A blended learning setting afforded a flow of learning activities between the online setting and the face-to-face medium. Chemistry topics which were started in class were continued online and discussions in the VLE were reinforced and continued in the face-to-face class. In this way, the online practices of the online learning community were adopted in the face-to-face class.

> *'In the beginning, I felt I was participating more in Moodle than in class, but then I got used to discuss in the class (face-to-face) as well,' Anthony (Marcato), class interviews, May 2008.*

The Marcato, Crescendo and Moderato students interacted as help-seekers and knowledge-mediators in both the online medium and in the face-to-face classroom. Some Staccato and Diminuendo students joined in the classroom discussions. Although other non-online participants remained passive learners in the face-to-face class, they still had the benefit of being observers in an active face-to-face environment.

This generated an atmosphere of connectedness, a spirit of collaboration and a sense of community in the face-to-face classroom, in the chemistry laboratories and as some students reported also in other contexts such as the library.

> *'Online I felt comfortable asking about a particular problem. There was time to write it in my own words. It felt more comfortable. This in turn made me feel comfortable also in the classroom. This chemistry class has a sense of community. …… in few weeks*

there was the feeling of togetherness in the classroom,' Francesca (Diminuendo), class interviews, May 2008.

The online learning identity influenced the face-to-face learning identity, and a new student learning identity was constructed This study showed that online participation made students feel more confident and more engaged with subject content in the face-to-face class.

'You know what is happening in chemistry. Moodle makes me feel more engaged in class. I know what we are doing; you do not feel lost in class; I would know what a topic entails and that there aren't things which I do not know about. I'll be sure that I would have covered everything in a topic,' Doreen, (Crescendo), in-depth interviews, May 2008.

The learning dispositions which were developed in the online setting, also prevailed in the face-to-face setting. Hence, the roles of help-seekers and knowledge-mediators were also adopted in the face-to-face setting.

'In the classroom, I definitely became more confident. When we were doing gases, I felt very confident. My friends in class were asking me how to solve the problems. I got used to solving the problems on gases from Moodle. I could help the others and show them how to work them out,' Kate (Crescendo), in-depth interview May 2008.

The Marcato student recounted how his online role was also transmitted to the face-to-face classroom and other contexts:

'Because of Moodle, everyone seemed to think that I know everything. Before a test, they come to ask me, and now it is not only chemistry, even biology, they ask me. Everyone asks me to help them with the work they do in the teacherial sessions. I end up in the library moving from one desk to another to help students. Carmen suggested that I should start charging them! ' Anthony (Marcato), in-depth interviews, May 2008.

Doreen commented on how the online setting made her aware of her new relational positional identity in the face-to-face class and made her feel more comfortable learning with her peers.

'You do not feel inferior to others in class (the face-to-face). You feel you are with them, you can learn with them,' Doreen (Crescendo), in-depth interview May 2008.

This contrasts with her reluctance in the first weeks to comment on the postings of her peers in her small group.

The evidence in this study shows that the social, teaching and cognitive presences which were developed in the online medium were also transferred to the face-to-face class. Bonk and Kim (2006) suggested that online practices can induce socio-constructive learning approaches similar to the online medium, in the face-to-face class. This study gave evidence that online learning influenced the learning approaches in the face-to-face class. The lectures in the face-to-face classroom became less structured and less individualised. Students participated in classroom discussions and the online experience facilitated the undertaking of collaborative work.

5.11 A model of the transformation of identities

The interaction of the new student learning identities in both the online and the face-to-face class projected a new class identity of active participation. During this course, this class of students developed a new class identity of active participation across the online and the face-to-face setting. The following comments convey the learners' feelings about the new learning community which was built in this chemistry A-level class

> *'Looking back, all our work is in Moodle. It is the work of us all, together. I think it is a good idea to extend next year,' Celine (Crescendo), in-depth interviews, May 2008.*

> *'This class is different to other classes because I know many students through Moodle. Moodle made me know the group and we are ready to help and work together in the class teacherials and labs', Marcus (Crescendo), in-depth interviews, May 2008.*

Figure 5.17 highlights the construction of the learning identities in the new figured world of discussion-based learning in both the online and the face-to-face setting. The figure is divided into an upper and a lower section. The upper section consists of three frames numbered 1, 2 and 3 respectively. Frame 1 represents a student's face-to-face learning identity 1 constructed in a didactic-based learning environment. The middle frame (Frame 2) represents the

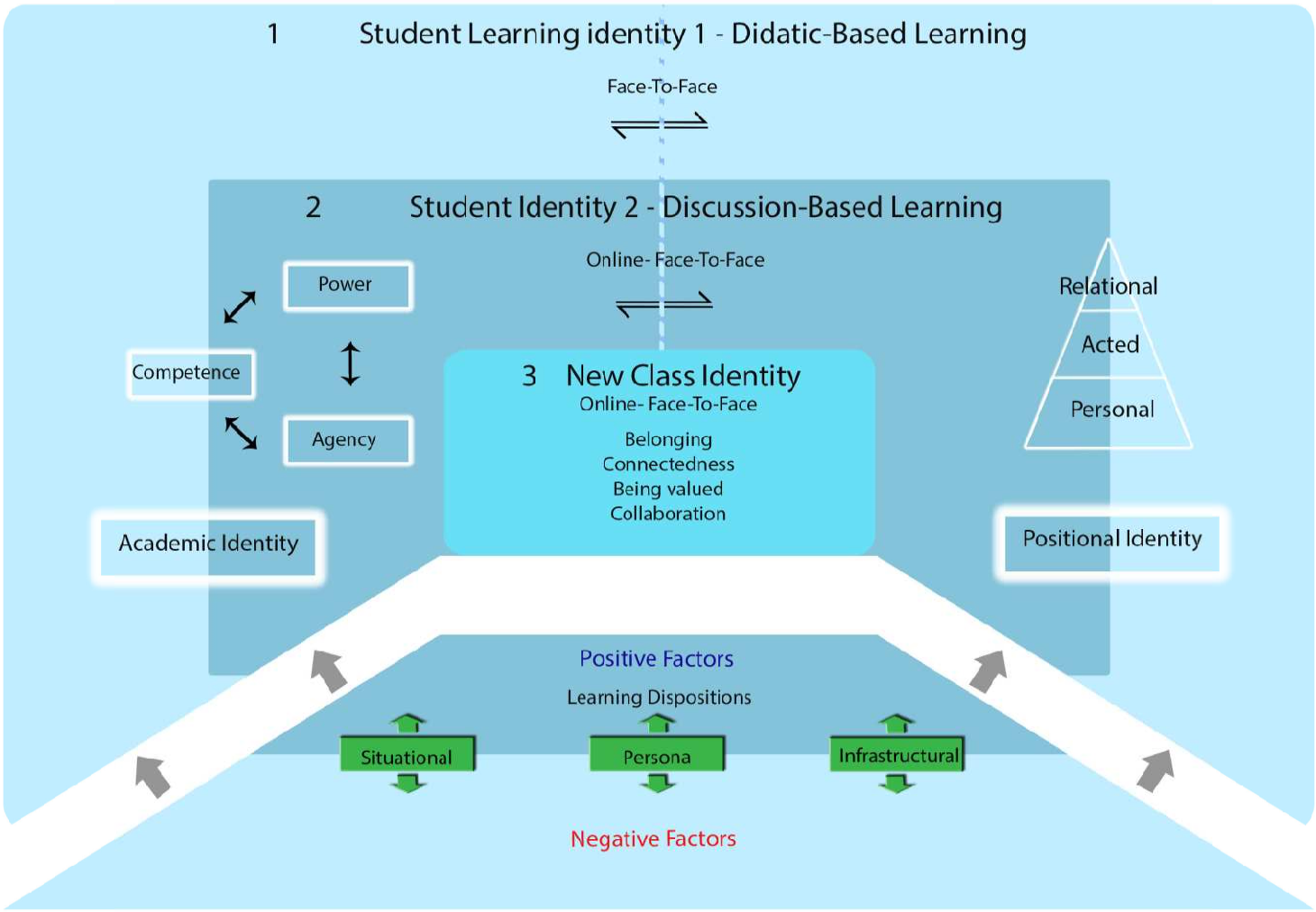

Figure 5.17. Model of the transformation of learning identities

student's new learning identity 2 constructed in a figured world of discussion-based learning in a blended learning context. Frame 3 represents the interactions of the new learning identities of the students in the class. Frame 1 and Frame 2 are vertically divided in two regions. The region on the left represents the academic identity and the region on the right represents the positional identity. The lower section has two layers. The lower layer represents the inhibitors which affected online participation. The upper layer represents the enablers for online participation. The inhibitors favoured the retention of student identity 1 (Frame 1). On the other hand, the enablers for online participation produced a change from student learning identity 1 (Frame 1) to student identity 2 (Frame 2). This change manifested as an increase in competence and development of agency and power (academic identity) is shown in Frame 2 (left side). In addition, the changes in persona-related characteristics, acted and relational positional identities are represented on the right side of Figure 5.17. The interaction of students with new learning identities formed a supportive and an active class (Frame 3). The students in this class projected a sense of belonging, of being valued, of connectedness, and of collaboration.

5.12 Conclusion

This chapter and Section 4.9 addressed the research questions in this study. The first research question was: What are the experiences of students following an online collaborative program in a blended learning context? This was explored by addressing the following two research sub-questions.

1.1 What were the online behaviour patterns of the learners following a blended course?

1.2 What factors influenced online behaviours in a blended learning context?

A complexity of behaviours was revealed in this study. Six behaviour groups of students were identified and labelled: the Marcato, Crescendo, Moderato, Staccato, Diminuendo and Ritenuto groups. This study revealed the factors which affected online participation. They were classified in three themes:

situational, infrastructural and persona-related factors (Figure 5.18). These factors were discussed in Part I.

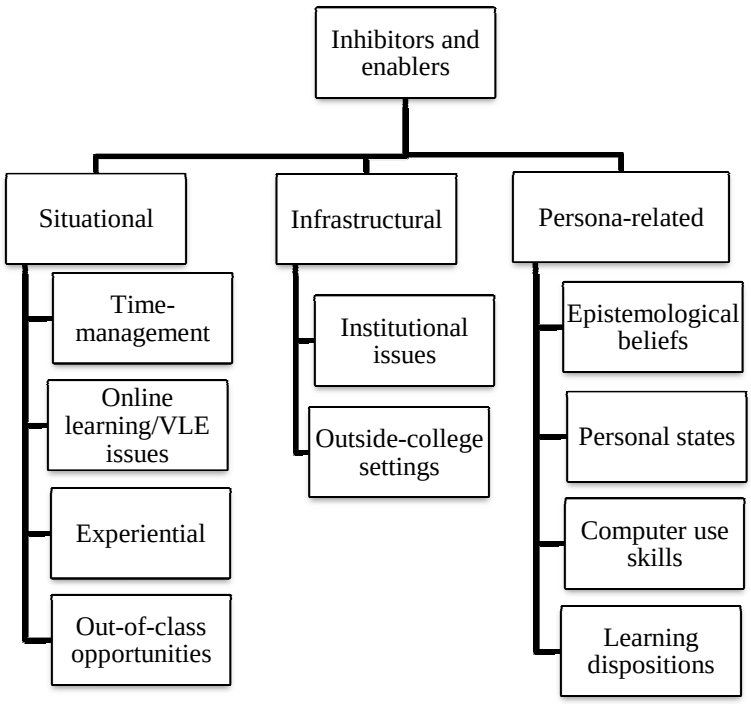

Figure 5.18 The factors affecting online participation

The Diminuendo, Staccato and the Ritenuto groups did not form part of the active online learning community. Situational factors, which were due to the personal lifestyle of the students, influenced their online behaviours. Negative persona-related factors affected the online behaviour of the Crescendo and the Moderato students. The Marcato, Moderato and Crescendo students formed an active online learning community of twenty-two learners (59.5% of the class). A set of four key online learning dispositions - resourcefulness, resilience, reciprocity and responsibility, were identified as enablers for online participation in a blended learning context. The Crescendo students were, at some stage, reluctant to participate in the VLE, but with a disposition of resilience, they eventually overcame their setbacks. The online participants were able to take responsibility for their learning and the learning of other students. They also showed indicators for the dispositions of resourcefulness and reciprocity, indicative of self-directive and collaborative learning.

This chapter also addressed research question 2: What was the impact of these online experiences on the learners? This was explored by addressing the two sub-questions 2.1 and 2.2:

2.1 How did online participation change the students as learners?

2.2 What was the impact of online learning on the learning identity of the learners in the online and the face-to-face class?

The online learning dispositions changed the students in the online learning community as learners: from passive learners in the face-to-face class and in the online setting, they became self-directed and collaborative learners with roles of help-seekers and knowledge-mediators.

A significant outcome of this research is the three learner roles model (Section 5.5.4.5.1). This model portrays the changes in the online participants as learners. In this model, the knowledge-mediators are at the core, surrounded by help-seekers and the non-collaborators stand at the periphery. The knowledge-mediators generated knowledge which flowed from the core of the model to the periphery. On the other hand a flow of roles took place in the opposite direction as some non-collaborators at the periphery became help-seekers and some eventually became knowledge-mediators.

The development of the online learning dispositions brought about further change in the learners - a transformation in their academic and positional learning identities. This is shown as a flow of events in the model of transformation of identities (Figure 5.17). A new academic identity was formed as a result of an increase in competence, development of agency and of empowerment in terms of taking responsibility to manage learning. A new positional identity reflected new beliefs in line with socio-constructive approaches to learning, awareness of new student positioning in class and the formation of relational identities which served as a motivation for students to improve their learning. These two sub-identities influenced each other.

This study provides evidence that online learning influenced the pedagogy in the face-to-class. The online participants carried their online learning habits to the face-to-face setting and transformed this class into a supportive and active

learning environment characterised by communication, interpersonal negotiation, interaction and discussions (Parker and Rennie, 2002).

The next chapter highlights the outcomes of this research, the limitations of the study, the contribution to knowledge, the implications for practice and discusses the options for further studies.

Chapter 6: Conclusion

6.0 Introduction

This chapter is organized into six sections. Section 1 outlines the context, the research questions and the research methodology. Section 2 presents the research outcomes and explains the contribution to knowledge which has been made in this research. Section 3 discusses the limitations in this study and Section 4 presents the potential of this study for further research. Section 5 considers the implications for practice, and Section 6 provides some concluding thoughts.

6.1 This research - the context

In this research, I, as practitioner-researcher, explored the online learning experiences of a class of thirty-seven college students who studied A-level chemistry in a blended learning context. The purpose of this research was to interpret and understand the meaning of the students' experiences in this innovative mode of learning and the impact of online learning on the learners.

6.1.1 The research questions

Two overarching research questions (Section 3.2) guided this study. The first research question was addressed through an exploration of two research sub-questions 1.1, and 1.2.

RQ1: What were the experiences of students following an online collaborative program in a blended learning context?

1.1 What were the online behaviour patterns of the learners following a blended course?

1.2 What factors influenced online behaviours in a blended learning context?

Chapter 4 addressed the research sub-question 1.1. It revealed the extent of the learners' online participation and discussed the students' online experiences as recounted in their non-anonymous responses in online discussions (Section 4.3)

and anonymous responses in questionnaires, personal reflections and student meetings (Section 4.4). The analysis of this data resulted in the identification of the general online behaviour patterns or groups (research question 1.1; Section 4.5). The research sub-question 1.2 was addressed in Part IV of Chapter 4 from anonymous and non-anonymous data and in Part 1 of Chapter 5, where the individual interviews were the primary data.

The second overarching research question was addressed through an exploration of two research sub-questions 2.1, and 2.2.

RQ2: What was the impact of these online experiences on the learners?

2.1 How did online participation change the students as learners?

2.2 What was the impact of online learning on the learning identity of the learners in the online and in the face-to-face class?

The research sub-question 2.1 was addressed, in first part of Chapter 5. The discussions on the learning dispositional factors (Section 5.5.4) as enablers for online participation revealed changes in some of the online participant students as learners (Section 5.5.4.5). Part 2 of Chapter 5 addressed the research sub-question 2.2. Focusing mainly on the Crescendo group of resilient students (Section 4.5.2.3), I explored how online learning transformed their academic and positional learning identities (Sections 5.10.1; 5.10.2).

6.1.2 The research methodology

This study is a multi method interpretivistic research inquiry conducted as a single case study (Section 3.5) of a class of students during the implementation of the online course in a blended learning context. A rich phenomenological description of the students' online and classroom experiences emerged from the learners' voices (Sharpe et al, 2005), giving a deep insight into the lived experience 'from the point of view of those who live it' (Schwandt, 1994, p. 118). In this study individual students responded to the classroom treatment as individuals and thus the individual student was used as the unit of analysis (Anderson and Burns, 1989; Freebody, 2003). These individual students were then grouped according to their overall online behaviour.

The data generation methods were:

- Observations, recorded in the researcher's reflective and observation journal (Section 3.12.1);
- the tracking system in the VLE (Section 3.12.2);
- online informal discussions (Section 3.12.4);
- three anonymous questionnaires – a profile, an early stages and a middle stages questionnaire (Section 3.12.3);
- a student non-anonymous reflection journal used in one online activity (Section 3.12.4);
- frequent unsolicited individual face-to-face chats (Section 3.12.1);
- two ad-hoc small group meetings (Section 3.12.5.1);
- two focus group meetings (Section 3.12.5.2);
- thirty-four final individual interviews; twelve of which were carried out in greater depth (Section 3.12.6).

The generated data was stored and analysed using the qualitative analysis software NVivo (Section 3.15.1). The findings from the final interviews at the end of the seven-month course were treated as primary data (for research questions 1.2, 2.1 and 2.2) which was triangulated with the other data, generated using other methods during the course.

6.2 Research Outcomes

The research outcomes are discussed in terms of the research questions.

6.2.1 Research Question 1:

What were the experiences of students following an online collaborative program in a blended learning context?

6.2.1.1 (RQ1.1) What were the online behaviour patterns of the learners following a blended course?

Despite the fact that Questionnaire 1 revealed that the majority of students (n=31; 84%) in this study were familiar with and liked technology (Section 4.2.1), and that teenagers are said to be digitally literate (Prensky, 2001) with a desire to be connected to each other and to the Internet (Oblinger and Oblinger, 2005), a diversity in behaviour patterns emerged.

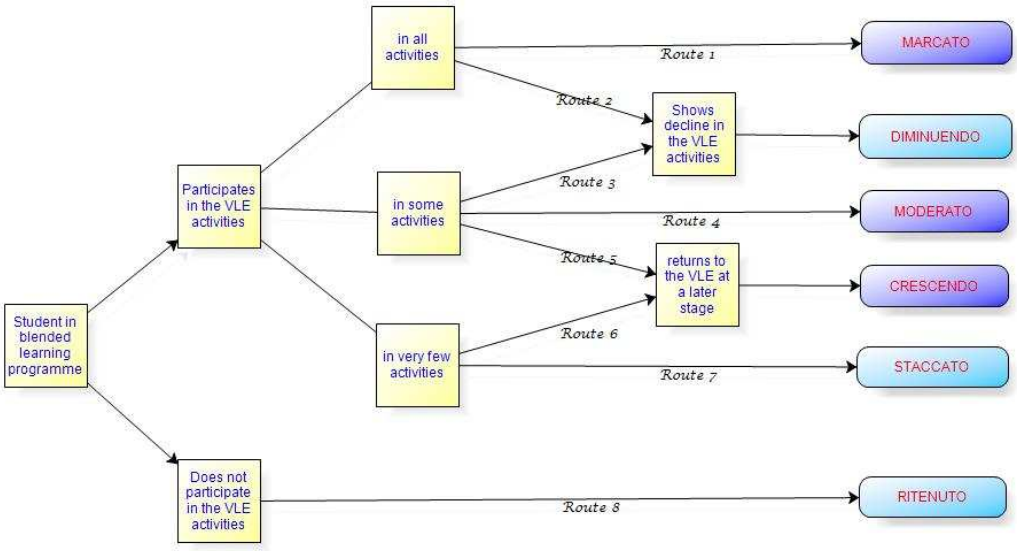

Figure 6.1 The behaviour patterns

Figure 6.1 illustrates the different behaviour patterns which gave rise to six online behaviour groups, labeled as Marcato, Crescendo, Moderato, Diminuendo, Staccato and Ritenuto (Section 4.5.1). Online collaborative learning resulted in a process of change which, brought about some anxiety and resistance (Akerlind and Trevitt, 1995; Taylor, 1986) in all groups except in the Marcato student. This study has identified three challenges (Section 5.1) which were required to be met by the students. These were:

- the acceptance of online learning as a learning method (Challenge 1);
- the ability to use the computer, the Internet and the VLE tools for learning (Challenge 2);
- contribution to online collaborative activities (Challenge 3).

The only Marcato student immediately met all challenges and participated enthusiastically in all activities. He became a self-directed learner, and encouraged and supported other students (Figure 6.1: Route 1). The Crescendo students (n=12), showed a reluctance to participate in the VLE at some stage in the course. Nevertheless, these students were resilient, and when they realised that online learning was relevant to their needs, they became active online collaborative learners (Routes 5 and 6). The Moderato students (n=9) eagerly took part in small group work and individual activities but did not contribute to online whole-class discussions (Route 4).

The Diminuendo (n=4) group participated in the VLE in the first term only and were active rejecters (Rogers, 2003) of online learning (Routes 2 and 3). The Staccato (n=7) and the Ritenuto (n=4) students failed to meet the first challenge. The Staccato students felt the need to learn, but were not interested to use the VLE for learning. They were infrequent participants (Route 7). The Ritenuto students were not interested in learning, and did not access the VLE (Route 8).

Several studies (Moore, 1998; Salomon, 2000; Jenkins and Healey, 2005; DEC, 2009; Pedro, 2010; Bonello Cassar, 2012) have shown that VLEs are used for convenience, and that students resist using technology for study purposes (Jefferies, Quadri and Kornbrot, 2006; Akerlind and Trevitt (1995); Guzdial et al, 2001; Roskowsk, Felder and Bullard, 2002; JISC, 2012). This study has shown that when certain students realise that online learning is relevant to their needs, they eagerly become online learners. In this study, 59.46% of the class (n=22) formed an active online learning community, and through their online collaborative activities, they generated knowledge which became available to the whole-class.

The Crescendo students needed time and opportunities to develop the online learning dispositions (Section 5.5.4.2.1) and become active online learners. Mitchell and Honore (2006) also noted that acceptance of the online course by students took time. A period of familiarisation, also mentioned by Salmon (2002) and Lehman and Conceicao (2010), was essential. Familiarisation, in

such cases, is an experiential process, and does not only entail knowing how to navigate in the VLE, or getting to know other participants.

6.2.1.2 (RQ1.2) What factors influenced online behaviours in a blended learning context?

The literature on factors affecting online learning in blended courses was scarce. However, several negative factors influencing online behaviours in this study were similar to those found in studies of fully online courses in Higher Education and adult learning (Section 2.2.3). The factors revealed in this study were categorised in three themes – situational, infrastructural and persona-related (Figure 6.2).

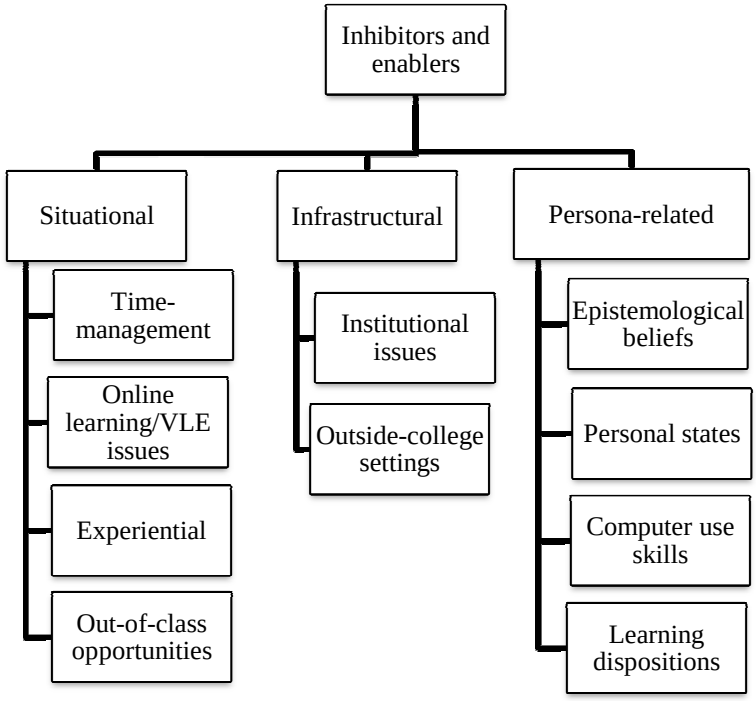

Figure 6.2 A framework of the factors affecting online participation

Situational factors were due to the personal choices (Stanford-Bowers, 2008) made by the students, and unless the students themselves were prepared to change their lifestyle, they could not be able to meet the challenges. This was the case with the Diminuendo, Staccato and the Ritenuto students who were affected by:

- time-management issues due to part-time work, community involvement, Internet games (Section 5.3.1);
- attitudes such as considering online collaborative learning as unnecessary work (Section 5.3.2.1)
- lack of interest in learning as they awaited other opportunities (Section 5.3.4);

In contrast, four Crescendo students, who had considered the Internet for leisure only (Section 5.3.2.3), did not give priority to chemistry online work (Section 5.3.2.2), and experienced previous or current group-work problems (Section 5.3.3.3.1), were resilient and on realising that online learning was relevant to their needs, they were able to overcome their situational problems.

6.2.1.2.2 Infrastructural factors as inhibitors

In questionnaire 1 (Section 4.2.1), all students confirmed that they had a computer and access to the Internet at home. This was very encouraging; I immediately assumed that all students would be able to use the VLE from their homes. Nonetheless, problems arose due to an outdated computer, low connectivity, and unavailability of the computers for study at home. In addition, the computers in the college laboratories (Section 5.4.1) were not always available.

6.2.1.2.3 Persona-related factors as inhibitors

Two major epistemological beliefs, personal states such as shyness, Cyberphobia, a lack of self-confidence and a lack of online reflective and writing skills were negative persona-related factors which affected the Crescendo and Moderato students. The majority believed that learning occurs when knowledge is transferred from the teacher to the students (Section 5.5.1.1), and that collaborative learning is not effective and efficient for learning (Section 5.5.1.2).

Nineteen students accepted online learning as a mode of study, but retained traditional learning expectancies (McConnell, 1994; Trigwell and Prosser, 1991; Mitchell and Honore, 2006). Some students expected immediate explanations from the teacher in the discussion fora. Others addressed the

teacher in the online discussions (Crook, 2002; Hammond, Trapp and Bennett, 2002). Some of these students confirmed that they did not have confidence in their peers and feared that the content posted by their peers would be incorrect (Sweeney, O'Donoghue and Whitehead, 2004) or non-examinable material. A student preferred to rely on the teacher's insistence to see her work in order to discipline herself to do it. Some students used the VLE only to download the teacher's posted articles and read class announcements. This study therefore showed that students accustomed to teacher-centred approaches encounter difficulties to adjust to online collaborative learning.

The students were, in previous years, immersed in a culture of individualistic and competitive learning (Section 1.2.1). In fact, 68% of the class (n=25) had never worked in groups. Eleven students did not believe that group work was an effective mode of learning (Sections 4.4.2.2 5.5.1.2). Bernard et al, 2004; Akerlind and Trevitt, 1995; Laurillard, 1993, Palloff and Pratt, 2001 considered this belief as a crucial online learner characteristic.

Some students considered collaboration as time consuming. Others had concerns about the functioning of groups. These included having to chase members, having to wait for them to do the work, having to do their work, having to settle for work of lower quality and becoming enraged if lurkers obtained the same grade.

Findings in this study confirm that as noted in the literature, some students resist collaborative practices (Guzdial et al, 2001; Ngor, 2001; Guzdial, 2003; Day, Lou and Van Slyke, 2004; Palloff and Pratt, 2005), may start the course with impressions and attitudes which negatively affect online participation (Mitchell and Honore, 2006; Trigwell and Prosser, 1991), and are not aware of the benefits of collaborative learning (Tu and Corry, 2003).

Similar to findings by Perrault, Waldman and Zhao (2002), Ramsey (2003) and Sweeney, O'Donoghue and Whitehead (2004) a lack of self-confidence and shyness resulted in a lack of contribution to whole-class online discussions. Such students feared that they would ask absurd questions or would not be able to express themselves to the whole-class (Section 5.5.2.2). Moreover, some

students felt uncomfortable critiquing or editing the work of others in the VLE (Macdonald, 2003; Section 5.5.1.2).

Some Crescendo students experienced frustrations and confusions due to lack of familiarity with the use of computers (Section 5.5.2.1). These findings confirm reports in the literature, that students may develop emotional states due to online participation, which in turn, result in a lack of participation (Zhang at al, 2004; Hara and Kling, 2000; Ragoonaden and Bordelau, 2000; Yamashiro and Lee, 2000; Sharpe et al, 2005; Cramphorn, 2004; Juutinen and Saariluoma, 2010).

In contrast to the Crescendo students, the nine Moderato students did not overcome their persona-related barriers for participation in the online whole-class discussions. Perhaps, the Moderato students could have become less shy to participate in whole-class discussions, if they had changed groups for small group work and familiarised themselves with other students. On the other hand, forming new groups for each online activity may have created problems, such as those experienced in the first collaborative task where the groups were selected by the teacher (Section 4.4.2.2.a).

6.2.1.2.4 Persona-related factors as enablers

This study provided evidence that the learning dispositions of resourcefulness, resilience, reciprocity and responsibility were the dispositional pillars of online collaborative participation. The identification of these four key online learning dispositions is an important contribution to knowledge as this underpins understanding of how these develop and impact on learning identities. These dispositions are mentioned in the literature, but have not been associated with blended learning and explored.

The disposition of resourcefulness (Section 5.5.4.1) is the willingness to learn from alternative and additional resources. It focuses on the cognitive aspects of learning. In this study, this disposition was indicated in students with:

- a curiosity about online learning and an academic curiosity;

- a confidence in the new learning design, in the teacher and in themself as a learner;
- a flexibility in the appropriate use of different resources.

Students with this disposition became self-directed learners demonstrating independence, self-management, a desire for learning and problem-solving skills (Chou and Chen, 2008). The students who lacked this disposition of resourcefulness did not meet challenge 1.

The disposition of resilience (Section 5.5.4.2) focuses on the emotional aspects of learning. This learning disposition enabled the twelve Crescendo students to persevere through their uncertainties and frustrations. In contrast, the Diminuendo students lacked this disposition.

The learning disposition of reciprocity (Section 5.5.4.3) focuses on the socio-constructive aspect of learning. It gave rise to learner interactions in the fora and wikis, and resulted in an online learning community with social, cognitive, and teaching presences (Garrison, Anderson and Archer, 2000) (Section 5.5.4.3.1). As students reciprocated and became engaged in joint online learning tasks in small group work and in whole-class discussions, they took on the roles of help-seekers and knowledge-mediators (Section 5. 5.4.3.2). These roles are discussed further in Section 6.2.3. The students who lacked this disposition were not able to meet Challenge 3.

The disposition to take responsibility (Section 5.5.4.4) for learning is fundamental, and it re-enforces and is re-enforced by the presence of the other mentioned dispositions. In traditional teacher-centred learning, the students rely for their learning mainly on the sense of responsibility of the teacher. In this course, the knowledge-mediators and help-seekers interacted together and shouldered the responsibility for their learning and that of their peers; they became self-directed and collaborative learners and also partners with the teacher in the learning process (Petress, 2008).

The students in this study who lacked these positive key online learning dispositions were unable to participate and contribute in the VLE. This study

showed that dispositions can be developed in interaction with other people (Carr 1995; Duncan, Jones and Carr, 2008). This occurred (1) through imitation and modeling (Section 5.10.2.3), (2) through discussion with peers (Section 4.5.9) and with the teacher (Section 5.5.4.2.2.iii), and (3) when the student perceived an urgent need for learning (Section 5.10.2.2). The findings in this study also imply that successful online learners are able to manage their time, have the appropriate online study setting and technology at home, and are self-confident to use the VLE for study and actively participate in the online activities. They also need to believe in the effectiveness of online collaborative learning, and to have online skills such as reflecting and writing when they are in the online environment.

6.2.2 Research Question 2:

What was the impact of these online experiences on the learners?

6.2.2.1 (RQ 2.1) How did online participation change the students as learners?

This study provided evidence that the online learning experience changed the students as learners in the course. The students changed when they took the opportunities to develop the online learning dispositions (Section 6.2.1.2.4). These dispositions resulted in further changes, e.g., becoming help-seekers and knowledge-mediators as described in the Three Learner Roles Model (Figure 6.3). Although this model demonstrates a process, it also represents the multiple changes which took place in the learners. These changes are discussed at the end of Section 6.2.2.1.1.

The Three Learner Roles Model

In small group work, the Moderato, Crescendo and Marcato students practiced the help-seeker and knowledge-mediator roles. In whole-class online discussions, the Marcato and the Crescendo students were the knowledge-mediators and /or the help-seekers, whereas the Moderato students were non-collaborators (Section 5.5.4.5).

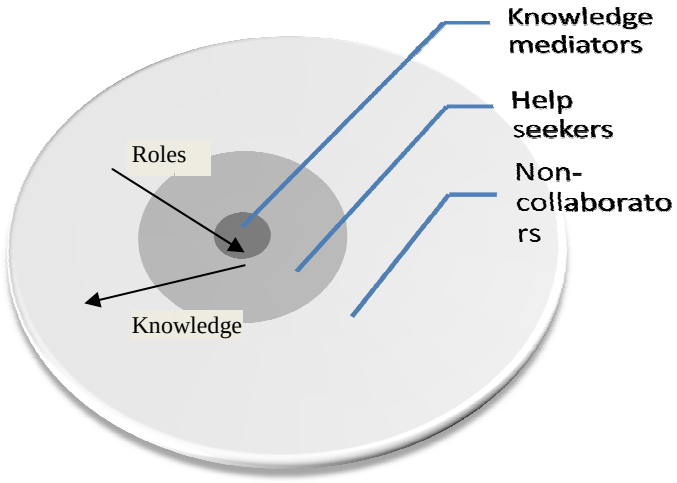

Figure 6.3 The three learner roles model

The knowledge-mediators modeled online contributory behaviour generating social, cognitive and teaching presences (Garrison, Anderson and Archer, 2000).The help-seekers expressed uncertainties and asked questions, and hence, contributed to the social and cognitive presences.

In the three learner roles model (Figure 6.3), the knowledge-mediators are visualised at the core surrounded by help-seekers. The non-collaborators are represented at the periphery. A flow of knowledge took place in the learning community from the core to the periphery. The knowledge-mediators clarified their understanding, filled in the gaps in their understanding, internalized and developed new perspectives and understandings. The help-seekers identified misconceptions, filled in the gaps in their understanding and constructed new knowledge (Web, 2008). The knowledge which was co-constructed by the online learners through social marking and socio-cognitive collaborative processes (Biott and Easen, 1994) was available in the fora to the observing online non-collaborators and even to the non-VLE participants who could read email copies of the ongoing online problem-solving activities. A flow of roles occurred from the periphery to the core, as some non-collaborators (Crescendo students) imitated the help-seekers. Similarly, some help-seekers (Crescendo

students) imitated the knowledge-mediators. In whole-class-discussions, the number of knowledge-mediators increased and the number of non-collaborators decreased as the course progressed. A move to full participation (Lave and Wenger, 1991) occurred and a characteristic online behaviour pattern was observed as non-collaborators increasingly became active learners.

The changes which were experienced by the online students as learners are listed below:

- a change in epistemological beliefs especially regarding self-directed and collaborative learning (Section 5.5.1);
- development of the online learning dispositions (Section 5.5.4) of resourcefulness, reciprocity and responsibility; the disposition of resilience in the Crescendo students;
- becoming self-directed learners (Section 2.3.2.2.1) and collaborative learners, gaining self-confidence and developing agency (Section 5.10.1.2) and empowerment (Section 5.10.1.3); in the process becoming help-seekers and knowledge-mediator (Section 5.5.4.5) .
- a change in learning identity (Section 5.10.4);
- a change in study patterns and study habits.

The online setting afforded a medium which allowed the shift and practice of roles. As discussed in a later section, these roles were also taken up by some students in the face-to-face setting. In addition, the blended environment, gave opportunities to passive non-online participants to benefit from the ongoing processes in the online and face-to-face environment.

6.2.2.2 (RQ 2.2) What was the impact of online learning on the learning identity of the learners in the online and the face-to-face class?

This study provided evidence that online learning resulted in changes in the academic and the positional identities of students. This is an important contribution to the literature. The four key online learning dispositions which were developed due to online learning resulted in changes in the academic and the positional learning identities and promoted learning.

In this study, the impact of the development of the online learning dispositions on the academic identity (Section 5.10.1) was explored through changes in competence, power and agency (Stets and Harrod, 2004). The impact on the positional identity (Kasworm, 2005; Holland et al, 2001, Solomon, 2007, Allen 2004) was explored through a multilayer perspective of three sub-identities – persona identity, acted identity and relational identity (Section 5.10.2).

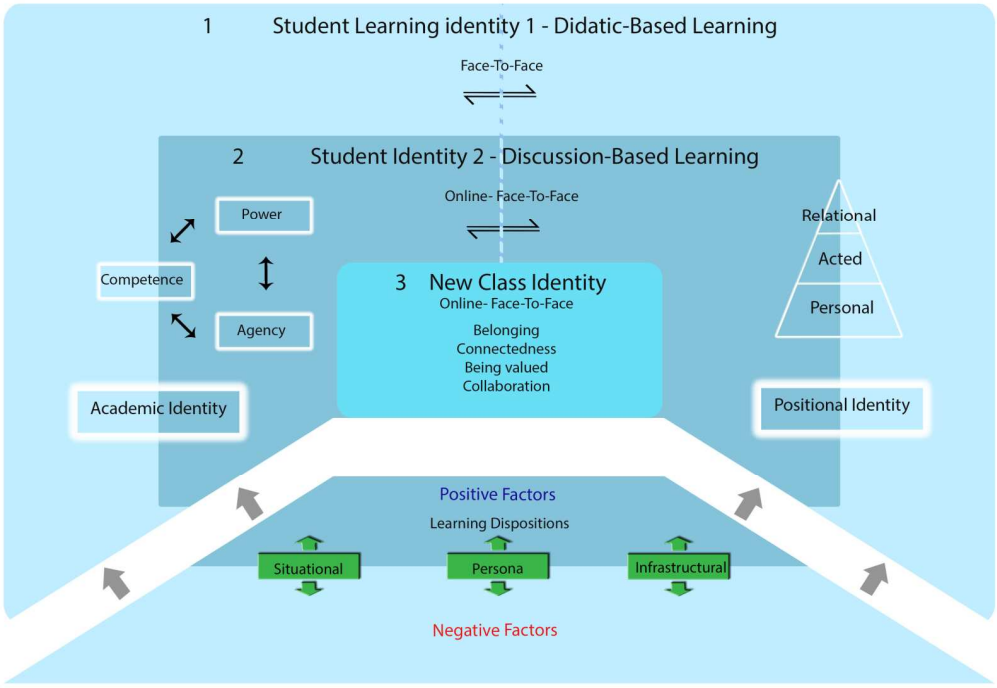

Figure 6.4 Model of the transformation of learning identities

This impact is portrayed in the Transformation of Learning Identities Model (Figure 6.4). The model highlights the construction of the learning identities in the new figured world of discussion-based learning in both the online and the face-to-face setting. The model has an upper and a lower section. The upper section consists of three frames numbered 1, 2 and 3 respectively. Frame 1 represents a student's face-to-face learning identity 1 constructed in didactic-based learning. The middle frame (Frame 2) represents the student's new learning identity 2 constructed in a figured world of discussion-based learning in a blended learning context. Frame 3 represents the interactions of the new learning identities of the students in the class. Frame 1 and Frame 2 are

vertically divided in two regions. The region on the left represents the changes in academic identity and the region on the right represents the positional identity. The lower section has two layers. The lower layer represents the inhibitors of online participation, which resulted in the retention of student identity 1 (Frame 1). The upper layer represents the enablers for online participation. These produced a change from student learning identity 1 (Frame 1) to student identity 2 (Frame 2). This change manifested as an increase in competence and development of agency and power (academic identity) is shown in Frame 2 (left side). In addition, the changes in persona-related characteristics, acted and relational positional identities are represented on the right side of Figure 5.20. The interaction of students with new learning identities formed a supportive and an active class. They projected a sense of belonging, of being valued, of connectedness, and of collaboration (Frame 3).

A notable finding in this study concerning blended learning is that, as suggested by Bonk and Kim (2006), online learning influenced face-to-face learning. This research provided evidence that the new socio-constructive learning approaches which were developed in the online setting induced pedagogical changes in the face-to-face environments (Section 5.10.4). My teaching strategy may have contributed to this transfer (Scagnoli, Buki and Johnson, 2009), but the online participant students were the catalysts for the change in the learning approach in the face-to-face class.

6.2.3 My research story

Figures 6.1, 6.2, 6.3, and 6.4 highlight the important findings and contributions to knowledge in this study. Fig 6.1 presents the behavioural patterns of online participation in a blended learning context, which led to the formation of the six behavioural groups. Figure 6.2 presents the factors which affected online participation and shaped the online experiences of the learners. A notable finding is the identification of the four key online learning dispositions as enablers and pillars for online participation in a blended learning context.

Figure 6.3 illustrates the Three Learner Roles Model, which shows the process of change from non-collaborators to help-seekers to knowledge-mediators

initiated in the VLE. This model expresses a major benefit of integrating online learning with face-to-face learning.

Figure 6.4 gives an overview of the study, highlighting changes in the academic (competence, agency, power) and positional (persona-related, acted, relational) identities of the learners, resulting from the development of the online learning dispositions. The readiness of students to act as knowledge-mediators and help-seekers and to indulge in discussion-based learning in the face-to-face class was another major benefit of integrating online learning with face-to-face learning. The interaction of the new identities produced a class of students with a community spirit. Blended learning has been promoted as the best compromise mode of learning because it has the potential to exploit the best of both face-to-face and online learning strategies (Section 2.1.4). This study has evidence to suggest that blended learning has advantages over traditional face-to-face learning. The face-to-face setting supported and reinforced the development of the learning dispositions, e.g., regarding the disposition of resilience, the Crescendo students were at least able to maintain contact with the learning community and subject content during the persuasion phase in the face-to-face setting.

6.3. Limitations in and critique of methodology

I conducted this research with the notion that this study was a double hermeneutic process - constructing reality according to my interpretations of the research participants' interpretations. Hence, I was determined to understand the students' experiences and I minimised the distance between myself and the research respondents (Lincoln and Guba, 1985) by building a good rapport with the students (Section 3.10). I was conscious not to allow my values and my biases to influence their responses.

Dey (1993) claimed that personal experience and prior knowledge may result in bias and interfere with the interpretation of data. I argue that the fact that this research was undertaken by a practitioner and not by an outsider researcher who has no inside knowledge is one of the strengths of this study (Goodfellow, 2005; Paris et al, 2007). Inside knowledge stands as a reference to the newly

gained understanding (Dadds, 2004), provides an insight in the data generation and the analysis phases (McCracken, 1988; Robson, 2000; Dadds, 2004; Diaz-Andrade, 2009) and furnishes the cognitive capacities to interact with the data (Corbin and Strauss, 2008).

A weakness of the study could be considered to be that it was conducted by one researcher (who was also the practitioner). Nonetheless, as discussed below, I as the practitioner-researcher addressed several issues of trustworthiness of the study.

The trustworthiness of this study (Section 3.15) is demonstrated in terms of credibility, transferability / relateability, dependability and conformability of the research (Lincoln and Guba, 1985; Miles and Huberman, 1994; Bush, 2002).

The credibility of the study and hence, its dependability, is enhanced by the use of a multi-method data generation approach including both anonymous and non-anonymous data to explore the online experiences of the learners. Furthermore, both focus groups and individual interviews were used. In the focus groups, students were encouraged by others to express their views, but some students may have had opinions contrary to those of the majority and felt uncomfortable to express them. The conduction of the individual interviews compensated for such disadvantages of the focus groups.

The final interview questions were carefully constructed and were informed by the data generated by the other methods. The in-depth interviews with the twelve Crescendo students, the prolonged engagement between the researcher and the participants during the seven month period, and the consequent development of good rapport and trust with the research participants contributed to the credibility of the study (Section 3.15).

I was aware of the teacher-student power relationships and that some students could have given answers which they did not believe in, but which they perceived were the ones I wanted to hear either, to please me, or out of a fear that there would be repercussions in the face-to-face class. A case in point could have been the students' responses in the interviews concerning their experiences and perceptions of collaborative learning. Although I did not

intend to influence their perceptions, I felt that it was important as part of my role as their teacher to occasionally remind the students about the effectiveness of collaborative learning (Tu and Corry, 2003) to encourage them to engage with the VLE.

Final interviews and questionnaires revealed that three out of ten groups of students worked together on online problem-solving activities at the College and communicated through emails, msn and telephone conversations.. The content of this informal type of communication was not available for analysis, but this was explored within the interviews and therefore informed the research. The students were able to read copies of the discussions in the VLE in their emails. This data could not be tracked, but this information was also obtained from the interviews.

I conducted online (Section 4.3.1) and unsolicited face-to-face discussions (Section 4.1.1) with the students to become aware of any sensitive or controversial issues. A case in point was the students' attitudes towards group work (Section 4.2.2). Through my words and actions, the students were assured that I was interested in their learning and that their learning was my priority. A good rapport (Section 3.10) was built with the students and this fostered a relationship of trust (Walford, 2001). Equal respect was shown to all students irrespective of their participation in the course or in the research.

The notion of relateability (Bassey, 1981; Dadds, 2004) or transferability (Lincoln and Guba, 1985) to other situations is more appropriate in this seven-month qualitative interpretive case study of thirty-seven students than the concept of generalisability (Scott and Usher, 1999). This one class of students presented diversity in behaviours (Section 4.5.2), which could also be identified in the previous cohort of students who participated in the exploratory study (Section 3.12.1). It is a great probability that these behaviours are also representative of the behaviour of students found in any other class of students following a blended course in any subject in similar colleges using similar pedagogies. It is to be noted that the research resulted in understandings which presented an informed approach useful to future blended courses and which can be shared by other practitioners. The thick descriptions of the student

experiences provided in the study enable other practitioners to develop contextual understanding and make informed judgements about the transfer of the results and conclusions to other situations.

The potential for transferability is enhanced because the learning approach in this study was based on a socio-constructive approach to learning, which is one of the contemporary theories of learning. This study thus is informed by theory and informs theory which has been promoted to guide learning globally, including Malta (Section 1.2.1; NMC 1999; NCF, 2012).

In qualitative research, a case is unique, and it is not possible to replicate all the instances of a former study (Bassey, 2002). Nonetheless the concept of reliability is replaced by dependability and confirmability (Lincoln and Guba, 1985, Shenton, 2004). These criteria necessitate transparency in the study which is created by detailed descriptions of the research design and its implementation to allow other researchers to work through the findings and reach the same conclusions. On my part, I did my utmost to ensure, that the findings and interpretations in the research were a result of the experiences of the participants and were not laden with my values and biases. The conclusions of the research depend on the subjects and the conditions of the inquiry (Guba and Lincoln, 1981) and not on the researcher (Miles and Huberman, 1994). This study was continuously discussed with my doctoral supervisor and on other occasions with two social study researchers at the University of Nottingham. The methodology and findings of this study were also discussed at a doctoral colloquium session at a conference (EAITM Malta, 2010).

6.4 The potential of this study for further research

1. The transformation of learning identities model (Figure 6.4) which in this study showed that the development of learning dispositions resulted in changes in the academic (competence, agency and power) and positional (persona, acted and relational) identities may be utilised to frame research in different contexts, e.g.,

    a. The whole model or particular aspects of the model, e.g., academic identity can be used as a tool in research which analyses processes in terms

of changing identities in other learning settings particularly those involving the use of innovations.

b. The model may also be used as a tool to design research exploring the changes in learning identities in other learning settings particularly those involving the use of innovations.

2. The outcomes of this research, suggest that the fusion of online collaborative learning and face-to-face learning is an effective strategy to facilitate a socio-constructive approach to learning in both the online learning component and in the face-to-face class. In this respect, further research is needed to identify factors which would expedite the process of shift in roles in the Three Learner Roles Model. (The nine Moderato students remained non-collaborators in whole-class discussions and it took some Crescendo students many weeks to participate in the VLE).

3. This study, carried out in a blended learning context, has focused on the impact of online learning and the online learning experiences. Further research may look deeper at the role and impact of the face-to-face learning component in the blend.

6.5. Implications for practice

This research is useful for teachers in institutions which (1) are in the stages of introducing and implementing blended learning, and (2) are considering a shift in pedagogy in the face-to-face classes from the traditional teacher-centred and transmission of knowledge approach to a socio-constructive approach. It is also useful for lecturers in universities who teach blended learning pedagogies.

This research is valuable and beneficial to the current teaching community in Malta. The National Curriculum Framework (2012) demands a pedagogical reform, where traditional ways of teaching are to be replaced by a socio-constructivist student-centred and an inquiry-based approach to learning.

> Teaching is most effective when learners are provided with opportunities to make sense of new knowledge in a context which allows them to interact with the teacher and other learners to discuss and negotiate their understanding.
>
> NCF, 2012 p39

Furthermore, VLEs are currently being introduced in several educational institutions in Malta. Short courses are organised on the technical use of the VLEs, but not on pedagogies of online or blended learning. This section discusses the implications for practice which emerge from this research.

6.5.1 Use of analytical and diagnostic tools

This research has produced a framework of student online behaviours and a framework of factors which affect online participation. These frameworks are of great use as analytical or diagnostic tools for teachers conducting blended learning courses.

6.5.1.1 A tool for the identification of online behaviours

Teachers engaged in blended learning will be able to understand and use the above framework (Figure 6.5) to be aware of and to be prepared for various online student behaviours. For example, the Crescendo students did not immediately engage with online participation. Thus teachers will be ready to support such students, by creating the right conditions for their learning.

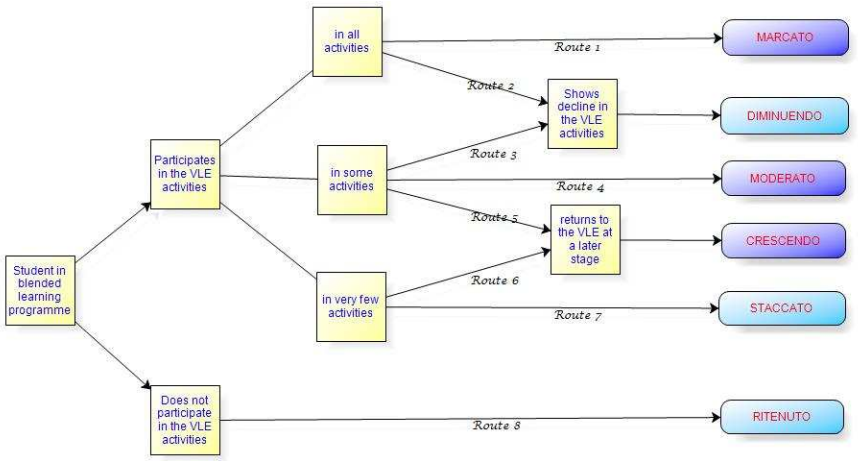

Figure 6.5 The framework for student online behaviours

6.5.1.2 An analytical/diagnostic tool of factors affecting online participation

The framework displaying the factors affecting online participation (Figure 6.6) is useful as both an analytical tool to help teachers understand the various factors which inhibit or enable online participation, and also as a diagnostic tool which can be used to support students. For example, infrastructural factors which inhibit participation need to be addressed at an early stage of the course. This research has shown that although some students confirmed that they had Internet access at home, in reality they were unable to work online due to connectivity or computer availability problems (Section 5.4.2).

The tool enables the teacher to be prepared to counteract the barriers to online learning. The teachers can then consider ways of motivating and encouraging student participation. For example, one barrier to online participation, which teachers might not expect to find, is the unwillingness of active Internet users to use technology for study purposes.

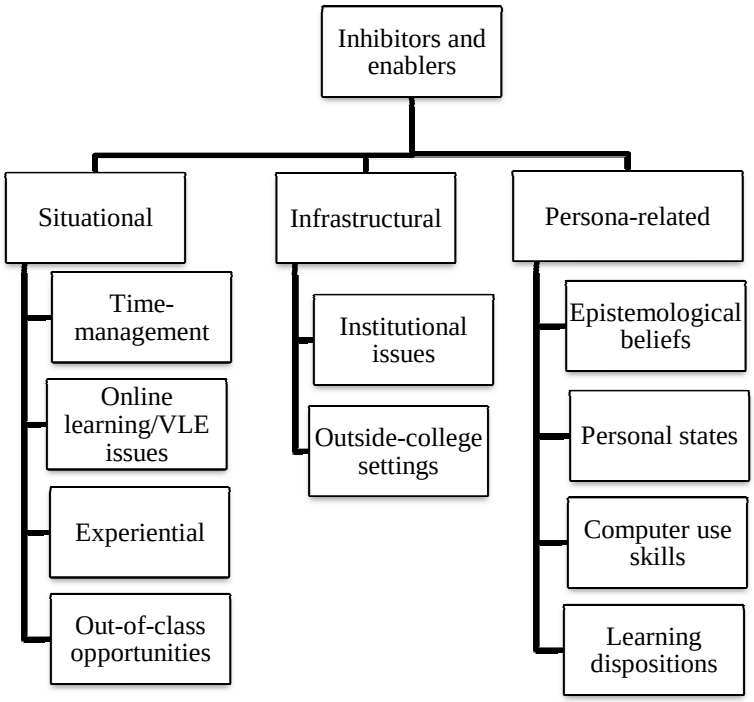

Figure 6.6 An analytical and diagnostic tool of factors which affect online participation

6.5.2 Design and implementation Issues

This research gave evidence that online learning influenced the pedagogy of the face-to-face class. This implies that blended learning delivered in the same way as in this study can be used to implement a socio-constructive approach to learning in the face-to-face class. Some teachers adopting a socio-constructive approach when they teach online may find it easier to use the same approach in the face-to-face class (Scagnoli, 2009). The blended learning design in this research therefore, provides a collection of practices for blended learning environments, which are of value to the teaching community who would want to promote socio-constructive approaches to learning in their face-to-face class.

6.5.3 Design for the development of dispositions

This study identified four key learning dispositions which are essential for successful online learning. This study showed that these dispositions can be developed and similar to the findings by Smith (2009), the dispositions of these college students were also transferred from one context to another, e.g., small group work to whole-class discussions, and from the online setting to the face-to-face classroom, lab or library. Learning designs similar to the one used in this study would support this transfer. Teachers need to be aware of these learning dispositions so as to encourage students to develop and cultivate them (Claxton, 2002; Claxton and Carr, 2004; Dweck, 2006) for online learning.

6.5.4 Interventions to support the change in students

The three learner roles model illustrates the shift in roles from passive-learners to help-seekers to knowledge-mediators which occurred during whole-class online discussions. The teachers, who are made aware of this possible shift, may be able to devise a means of supporting the shifting process. They will be able to observe the community and use learning activities as interventions to decrease the number of passive-learners, and increase the number of help-seekers and knowledge-mediators, thus increasing active learning in the community.

6.5.5 Examples of student experiences as scenarios

This research has generated an immense amount of content which can be used to promote blended learning within a socio-constructivist approach to learning. This includes the large amount of comments as students' voices from informal and formal chats in VLE, in addition to data from questionnaires, focus groups and interviews. My experience has revealed that direct quotations from the online learners provide suitable scenarios for discussions and make a positive impact regarding the effectiveness of online learning. These scenarios, when presented as a set of resources, help online teachers and student teachers to understand the learning processes and experiences of novice online learners. Such resources can also be of great value when they are used to encourage new online learners.

6.5.6 Training of in-service teachers and student teachers

Virtual learning environments (VLEs) are currently being introduced in the educational institutions in Malta. The National Curriculum Framework (2012) stresses the inclusion of

> learning programmes that focus on understanding and emphasise the learning process and the active co-construction of meaning ..... that empower teachers to implement innovative teaching/learning strategies especially through the use of eLearning (NCF, 2012, p 31).

Teachers need to be taught how to integrate the tools for a student socio-constructive experience of learning (DEC, 2009), what to expect from the learners in terms of online behaviours and how to enrich the learners' online experiences. This study can contribute to this training which would ensure better online management and an increase in student engagement with online learning.

6.6 Concluding thoughts

As a practitioner I have moved from ongoing evaluation and revisions of my blended learning designs to a more considered approach as a practitioner-researcher exploring the complexity of the learner experience and of the ways that the learning identity can be shaped by blended learning. As a result, my standing as a researcher has developed within my institution and within the wider educational community within Malta itself, through conference contributions and dialogue with colleagues and student-teachers. My next steps will be to disseminate this work more widely though international conferences and research papers. It is my intention not only to use this work as a lens on my own practice but to support others to explore their classroom practice in similar ways so as to enhance the student learning experience and the understanding of these experiences. These practices would ensure learning gains for the students themselves.

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Institutions

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Conferences

The Variety of Teaching Chemistry Conference, 2001. The University of Lancaster, Lancaster 18 September 2001. Royal Society of Chemistry.

EAITM, 2011. Forum for Business Education Research and Development Malta 27-28 September 2011. University of Malta.

Appendices

Appendix I: A consent letter (principal)

The Principal,
Junior College,
University of Malta

23rd September, 2007

Dear Mr Muscat,

Re: Consent for research work to be conducted with one A level Chemistry Class during the 2007-2008 academic year at the Junior College

I am conducting a doctorate programme at the Institute for Research in Learning and Teaching in Higher Education (IRLTHE) (School of Education) at the University of Nottingham. I have started my third year and during this year I shall be in need to conduct my major field study.

I would like to ask for your approval and support for the conduction of this study during this academic year. In this research, my A level chemistry class students (1st years) will be participants. They will be involved in a blended chemistry 'A' level programme, where the online component will complement the face to face lectures. As this will involve online support to work covered in class, and collaborative home work, it will definitely be of benefit to the students. The students will be asked on a voluntary basis to answer questionnaires and some of them will be interviewed. Some students will be asked to be participatory researchers in the process. I will hold interviews with these students on a regular basis, e.g. once every month. Students will be asked for their consent to participate in the study and to be audio taped.

I would greatly appreciate your approval. Kindly find enclosed copies of statements of research which have been submitted to the Ethics Research Board at the University of Nottingham.

Thank you,
Yours sincerely,

Sharon Role

Appendix II: A consent letter (students)

Department of Chemistry
Junior College

12.10. 2007

Dear student,
I am conducting research work in preparation for my studies at the University of Nottingham. My research focuses on improving the quality of learning and teaching of 'A' level chemistry. During this year, I intend to involve your chemistry class as participants in my research. Participation in this research is voluntary. Kindly, read this information letter and consider the accompanying participant consent note.

As in other past years, this year's chemistry 'A' level programme will consist of a face-to-face class component and an online component. The online component will be delivered through a virtual learning space (Moodle) which is set up by the IT Services Department, at the University of Malta. The online component will support and complement the work which will be done in class. It will include spaces for student lecture support, for problem solving and for collaboration on chemistry projects.

My personal research, at the University of Nottingham, focuses on how traditional class students experience online learning. Hence, I would like to invite you and other students in your class to be participants in this study. All participants will be required to voluntarily answer some (~three) questionnaires. Some participants will be asked to volunteer to participate in two focus groups. Each focus group will meet once. From time to time, some students will be asked to volunteer to act as consultants. This will entail a fifteen minute occasional (once a month) informal meeting with a few individual students and an interview.

Anything you write or say will be kept confidential. I shall not use your actual name in my reports. The collected data will be used to map out student profiles, and to indicate, which characteristics of students are essential for successful learning in a blended (face to face plus online) context.

I do not see any risks in your participation in this research. Filling in the questionnaires and attending the interviews might take some of your time. You can decide at any time not to be involved in the study. If this happens, kindly inform me about your withdrawal. This will not affect your participation in the online module or in class. Your decline to participate will not be detrimental to you in any way.

If you agree to be involved in this study, kindly read and sign the participant consent form. Your participation in the research process will be of great benefit to me in designing blended learning programmes in 'A' level chemistry. My goal is to make learning of chemistry more effective, efficient and enjoyable. Therefore, you, your class and future students may benefit from this research.

I thank you for reading this information. Please, if you are willing to form part of this study (filling in questionnaires and being interviewed), kindly sign and return the participant's consent form to me by the end of this week. Greatly appreciated,

Regards

Sharon Role

Appendix III: The profile questionnaire (Q1)

Dear Student,

The purpose of this questionnaire is to collect data about your experiences of technology. It should not take you more than 20 minutes to answer these questions. There are no right or wrong answers. Thank you for your time to answer this questionnaire.

Best wishes

S Role

21.10.2007

Personal details:

1. Age (last birthday): 2. Gender: i. M □ ii. F □

Use of Technology:

3. Do you have Internet access at home?

i. Yes □ ii. No □

4. Do you have any limitation/restriction to Internet use at home?

i. Yes □ ii. No □

If yes, please give reason …….

…….

5. For how long have you been using Internet? (tick as appropriate)

i. 0-6 months □

ii 7-12 months □

iii 1-2 years □

iv. more than 2 years □

6. How often do you normally access the internet and/or e-mail?

i. every day □

ii. once every 2-3 days □

iii. once every 4-6 days □

iv. once a week □

v. occasionally □

vi. rarely □

vii. never □

7. How many hours do you normally spend on the Internet in a week?

8. Please, for each item, indicate how you spend your time on the Internet. (Tick as many as necessary, and mark under frequence of use)

		Most of the time	Frequently (often)	sometimes	Occasional -ly	Rarely	never
i	Download music /games						
ii	Download software						
iii	Download videos/films						
iv	Watch videos						
v	communication with friends						
vi	listen to music						
vii	Play games						
viii	Search for study related information						
ix	Search for hobby/interest related information						
x	To pay or/and check for services eg banks, memberships, topping mobile phones						
xi	To buy products						
xii	Do coursework						
xiii	Other, please specify						

9. Please indicate which of the following online applications you use:

		never	a little	moderately	a lot
i	Online social networking eg Facebook, Hi5,				
ii	Photosharing eg Flickr				

iii	Online text chat eg msn				
		never	a little	moderately	a lot
iv	Internet Telephony eg Skype, Msn voice				
v	Video sharing eg YouTube, Google Video,				
vi	virtual learning environments eg Moodle				
vii	personalised web-page (own web-page)				
viii	listservs				
ix	email				
x	Other applications (please specify)				

10. Please indicate the type of technologies that you are familiar with, and their frequent use.

		Leisure/Personal				Study-college related		
		A little	Mode-rately	A lot		A little	Mode-rately	A lot
a	CD/DVD							
b	Video							
c	podcast							
d	Mp3/4 player							
e	computer							
f	Mobile phone- sms							
g	Mobile phone voice							
h	Memory stick							
i	Text-chat							
j	Voice-chat							
k	Video-conferencing							
l	e-mail							
m	Instant messaging eg msn, ICQ							

n	blogs							
o	wikis							
p	Instant messaging (ignore)							
q	Voice-over eg Skype							
r	Virtual worlds/3D worlds							
s	Discussion boards							
t	Online dictionaries							
u	Electronic libraries							
v	Search engines							
w	Photoshop or similar							
x	Powerpoint							
		Leisure/Personal				Study-college related		
		A little	Mode-rately	A lot		A little	Mode-rately	A lot
y	WordProcessing							
z	Spreadsheets							
	Other, pleases specify,							

11. List four technologies from the above lists (in No 13 & 14) which you like to use most, (if any).

i…… iii……

ii…… iv …….....

12. Please tick which one of the following applies to you. Please indicate whether you (1) disagree strongly, (2) disagree, (3) neither agree nor disagree, (4) agree, or (5) agree strongly, with each of the following statements.

		1 Disagree strongly	2 disagree	3 neutral	4 Agree	5 Agree strongly
a	I feel reluctant to use computers					
b	I find using technology in general difficult to handle					
c	I am constantly looking forward to my next Internet session					
d	I cannot stand a long period of time without Internet access					
e	I have changed most of my habits (eg sleeping, eating) since I had Internet access					
f	My school grades have suffered due to Internet access					
g	My school grades have improved due to Internet access					

13. Were there any points or comments, which came to your mind as you were answering the questionnaire? Kindly add them here.....

Thank you,

S Role

Appendix IV: The early stages questionnaire (Q2)

Dear Student,

The purpose of this questionnaire is to collect data about your current experiences of the VLE (Moodle). There are no right or wrong answers. It should not take you more than ten minutes to answer these questions. Many thanks for your time to answer this questionnaire.

Best wishes

S Role

11.12.2007

Personal details:

1. Age (last birthday): 2. Gender: i. M □ ii. F □

VLE issues

3. Has your access and use of Moodle affected the usual time you spend on the internet?

i. Yes □ ii. No □

4. Please mark the following as appropriate:

a	Since, I have started accessing Moodle, I am spending more time on Internet	
b	I access and use Moodle, but the time I spend on the Internet has roughly remained the same as it was before I used Moodle.	
c	I rarely access Moodle	
d	I have not accessed Moodle.	

5. If you marked 4a or 4b, please comment on the time you spend per week on Moodle only.

i. How many hours per week?

…….

ii. Do you visit Moodle every day?

…….....

iii. Do you look into Moodle from time to time (often eg every 2 hours) every day?

iv. Do you look into Moodle from time to time (often, eg every 2 hours) every few days?

6. If you ticked 4c or 4d please give reasons

……

……

7. Please tick which one of the following applies to you. Please indicate whether you (1) disagree strongly, (2) disagree, (3) neither agree nor disagree, (4) agree, or (5) agree strongly, with each of the following statements.

		1 Disagree strongly	2 disagree	3 neutral	4 Agree	5 Agree strongly
i	Having an online medium (Moodle) to complement class work from home is a good idea					
ii	Doing chemistry work as a team is a good idea					

8. Is there anything in the Moodle online support which is of concern to you? Eg access, working in teams, asking difficulties, navigation through Moodle etc

9. Are you finding Moodle useful? Please add your comments.

10. What do you like most in Moodle?

11. Any other suggestions, comments……..

Thank you,

S Role

Appendix V: The student's reflective journal

Reflections on the first collaborative activity

Uses and applications of radioisotopes

1. Have you learnt chemistry content through this activity?
2. Did you enjoy doing this activity?
3. Were you an active member in this group? Reasons?
4. How did this activity work for you and your group members?
5. Where there any problems with respect to team work?
6. Where there any other problems?
7. Do you have any suggestions for improvement?
8. Do you recommend similar activities?

Appendix VI: The middle stages questionnaire (Q3)

Dear student

Can you kindly answer the following questions? It should not take you more than fifteen minutes. Your response will help me understand how you worked through the last Moodle tasks. It will help me design and improve other tasks and also decide whether such tasks are useful or not. I thank you for your role as consultants in this research. I appreciate greatly.

Please note that, as usual there are no right or wrong answers here. It is extremely important to tell me how you feel and what exactly happened (If you were not an active member in the group, it would be very important to me to know the reasons, whatever they are!) Give as much detail as you can- you may use the reverse side of the sheet to add more details.

Kindly return the questionnaire by Monday 18th February.

Thank you

S Role

14.02.2013

Personal Details

1. Gender: Male □ Female □ **2.** AGE: _____

Past papers group-work

In the past weeks, you were asked to participate in group work involving two sets of past papers (Set 1- Atomic Stucture and Set 2- Bonding). Please decide which one of the following applies to your situation (ie. whether you fit in the description of Students A or Student B etc)… and then answer the relevant questions.

3. Which of the following students do you consider yourself to be (circle the correct letter- eg Student ©)?

a. Student A: participated and contributed in both sets 1 and 2.
b. Student B: participated and contributed in Set 1 (atomic structure) only
c. Student C: participated and contributed in Set 2 (bonding) only
d. Student D: did not participate in Set 1 and did not participate in Set 2
e. Student E: other (does not fit in either of above)

If you are student A, please skip Question 4 and go to Q5 and then to the other questions. All other students please answer Q4 and then go to Q5 and then to the other Questions.

4. If you are student B, C, D or E kindly explain why you did not contribute to both sets……..what inhibited you from participating and contributing to your group?

5. Do you think that your group for sets 1 and/or 2 worked better than the group you were in for the radioisotopes assignment? Why?

6. What did you like most about this activity which involved answering questions from past papers in your group and making it available for other groups?

7. What didn't you like about this session of group-work (past-papers activity)?

8. Which one of the following applies to you (note there are 2 tables – one for Set 1 and the other for Set 2.:

a. Set 1. (ATOMIC STRUCTURE)		
i.	Each member in the group worked out most of the questions (in wiki or out of wiki) and then we chose best sections and edited to present our answer	□
ii	Each member in the group worked on a different part and then we compiled all parts to present our answer	□
iii	One member did most of the work and the other members read and added minute details to the work prepared by the first member	□
iv	Members in the group relied on ***one (or two)*** person/s to do all the work (please indicate whether *one or two* persons)	□
v	No-one did any work	□

vi	Put in any additional comments relating to above or some other mode of group function:

b. Set 2. (BONDING)		
i.	Each member in the group worked out most of the questions (in wiki or out of wiki) and then we chose the best sections and edited to present our answer	□
ii	Each member in the group worked on a different part and then we compiled all parts, without reading and commenting on each other's work.	□
iii	Each member in the group worked on a different part, then we read and commented on each others' work and finally, we compiled and presented our answer.	
iii	One member did most of the work and the other members read and added minute details to the work prepared by the first member.	□
iv	Members in the group relied on ***one (or two)*** person/s to do all the work (please indicate whether *one or two* persons)	□
v	No-one in the group did any work	□

9. Did the method, which you used (chose in Q8) to work through the past papers work well for your group?

Set 1: Yes □ No □

Comments: (Why yes or why not)

Set 2: Yes □ No □

Comments: (Why yes or why not)

10. Which modes of communication did you use to discuss your work?

□ Wiki

□ Discussion forum in Moodle

□ msn text-chat

□ e-mail

□ sms

□ free lesson at college

□ phone (mobile)

□ telephone (land line)

□ other (please specify) …….

11. How do you describe your activity in the group for Sets 1 & 2?

	Very active	moderately active	less active	inactive
Set 1 (Atomic Str)				
Set 2 (Bonding)				

12. Did you learn from these activities (working through past papers)?

13. Did you read through the answers of past papers which were prepared by **other groups**? If your answer is in the negative, please tell me what inhibited you from doing so.

14. Do you intend to use the past papers prepared by others for revision in the future?

15. Do you think that working through past papers with the final outcome of having many worked examples through team work in your class is a good idea? Comments?

16. What are your concerns regarding this "team" past paper work?

17. What do you suggest regarding future similar tasks?

18. Which one(s) of the following, do you think, applies to you (you may tick more than one, but if you choose more than one, kindly rank (1,2,) your choices with number 1, being the one which is mostly you)

i.	I am keen to share and discuss with others in Moodle.	□
ii.	I am keen to help others in Moodle.	□
iii.	I was keen to use Moodle but eventually declined to use it. *	□
iv.	My interest in Moodle changes continuously.*	□
v.	I was reluctant to use Moodle at first, but eventually picked up interest.*	□
vi.	I find it easy to engage socially in informal chat, but do not find it easy to take part in discussions.*	□
vii.	I am a read only participant. I am interested and follow most of what is said and done, but I am reluctant to contribute to discussions. However, I participate and contribute in the wikis.*	□
viii.	I have not used Moodle much, but I intend to use it; I have not yet settled into using it.*	□
ix	I was not interested to use Moodle and am still staying away from it.*	□

19. If you have marked a statement, which has an asterisk (*), can you kindly explain in more detail your situation eg reasons, feelings, attitudes, ….whatever…the truth.

Thank you

S Role

Appendix VII: The focus group question schedule

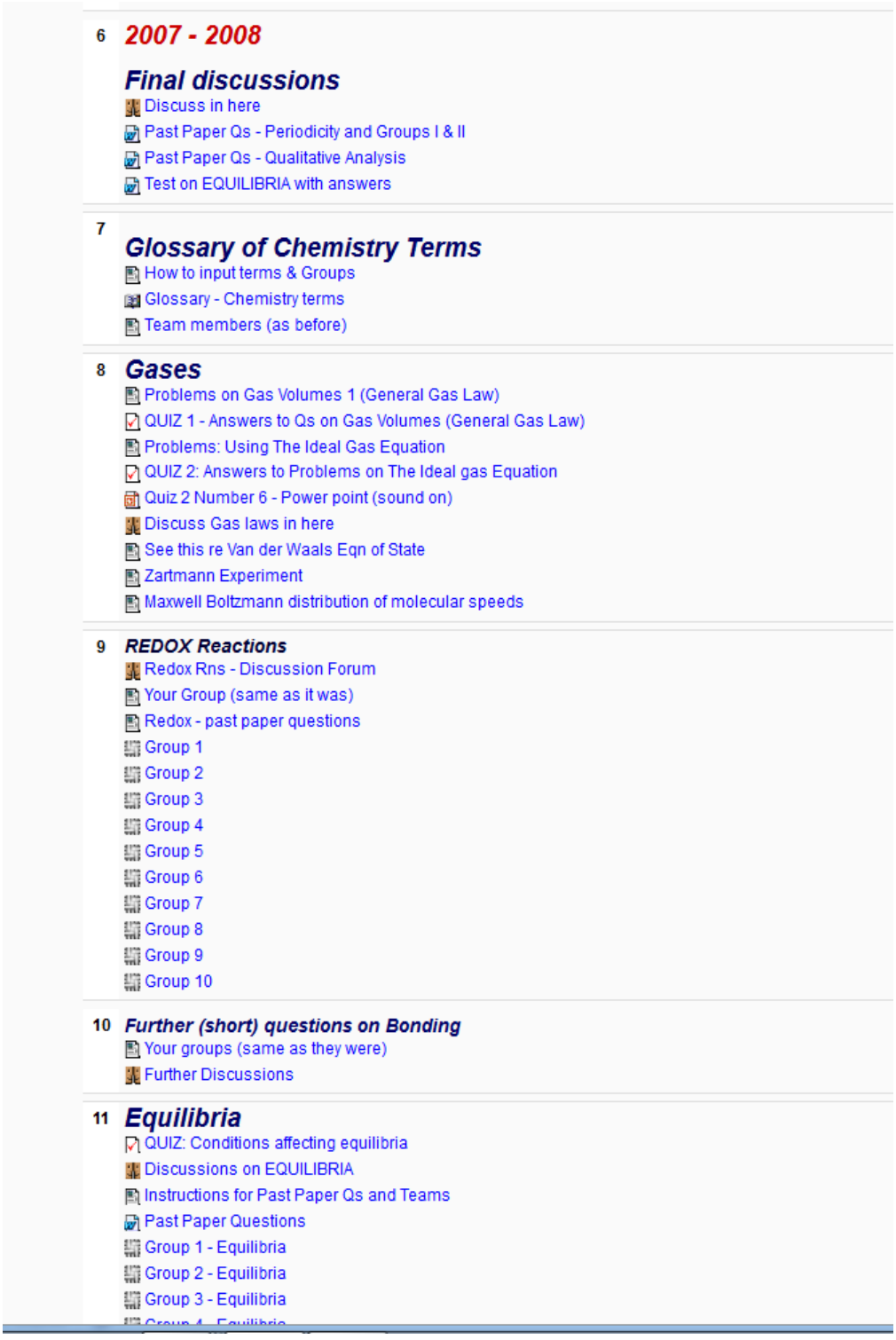
1. Brief explanation for conduction of Focus Group. The importance of the students' honest responses.
2. Why do you use Moodle? (the students referred to the VLE as Moodle)
3. How would you feel if there will not be Moodle for the next topic in class?
4. What did you expect from Moodle? Were your expectations met?
5. Whom do you see when you are working in Moodle?
6. How do you see yourselves in Moodle, in the face-to-face class?
7. Is Moodle helping you to be what you are in class?
8. Did Moodle make a difference to you as a learner? In what ways?
9. Which type of Moodle activities do you like?
10. Would you like to put forward suggestions or comments regarding use of Moodle?

Appendix VIII: The members of the small groups

Table 1. The members with a particular type of online behaviour in the small groups

Group	Marcato	Moderato	Crescendo	Diminuendo	Staccato	Ritenuto
1			2	1	1	
2			2			1
3			2			1
4		1			2	1
5	1	1	1	1		
6		3				
7		1	2	1		
8		1	2	1	1	
9		2	1		1	
10					2	1
Total	1	9	12	4	7	4

Appendix IX: Section of the front page in the VLE



Appendix X: An asynchronous discussion forum

(The sections in the discussion which are in bold are in English; the rest of the discussion is in Maltese. Maltese students have a tendency to use both languages when they explain to each other)

by Doreen Sunday, 4 May 2008, 02:59 PM

for the first question i was thinking that the eqm might shift to the right since there are more moles on the left... can anyone tell me why doesn't this happen pls?

Show parent | **Edit** | Split | Delete | Reply

Re: Three short teaser questions from Past papers
by Marianne - Sunday, 4 May 2008, 03:14 PM

In the first part you are told to add an inert gas/ noble gas. An inert gas don't take part in any reaction as it does not effect the partial pressure of the reactants/ products.

Show parent | Edit | Split | Delete | Reply

Re: Three short teaser questions from Past papers
by Marianne - Sunday, 4 May 2008, 03:19 PM

Jin ma l **asewers ta questions 1 & 2** qbilt imma li ma nistax nifem ques 3. Kif tkun taf li andek **thermo-neutral reaction?**

Show parent | Edit | Split | Delete | Reply

Re: Three short teaser questions from Past papers
by Doreen - Sunday, 4 May 2008, 03:22 PM

question 2 ma fimtix lol.. ima **question 3** naqbel ma kim u al darba ma ethan.. nahseb li b laktar wahda li tamel sens a nahseb li ma tantx tamel sens u c ma nahsibx li kiku **l-quantities** kinu se jkun ezatt xorta

Show parent | Edit | Split | Delete | Reply

Re: Three short teaser questions from Past papers
by Kate - Sunday, 4 May 2008, 03:39 PM

question 3; ax hu qallek li avolja it-temperatura inbidlet Kc baqghet l-istess. is-soltu Kc tinbidel ax **ez endothermic reaction** issir izjed mill- **exothermic** meta **temp**. tizdied.

Allura qisek trid tehodha li ladarba Kc baqghet l-istess la hemm endo u lanqas exo allura neutral....ok??

Show parent | Edit | Split | Delete | Reply

Re: Three short teaser questions from Past papers
by Marianne - Sunday, 4 May 2008, 03:54 PM

Eee ok issa fimta question 3 ax is soltu meta zzid it temperature Kc tinbidel. **10x**

Show parent | Edit | Split | Delete | Reply

Re: Three short teaser questions from Past papers
by DANIELA CARABOTT PAWLEY - Monday, 5 May 2008, 10:47 PM

thanks mar

Appendix XI: Problem solving in the wikis

(Each student wrote in a particular colour in the draft form in the wikis)

i) calicium hydride: (still not sure) Lanqas jien ma naf kif irid jigi dan {btw, minix certa fuq da laqqas jin lol}

ii) methane covalent with 4 bonding pairs (tetrahedral shape) di irnexxeli insib is-shapebig grin

iii)ammonioum chloride is ionic: NH4+ and Cl-.. however NH4+ alone is covalent and has a dative covalent bond (naqbel)

b)i) this is when the sharing of electrons in a covalent bond is unequal since the atoms making up the bond do not have the same electronegativity. (jin amilta this is where one of the atoms exerts a greater attraction for the electorns than the other..mixed) {jina bhal karen amilt lol}

ii) can't do via computer i dont know how

iii)the strongest type of intermolecular force is the hydrogen bond. this is present when nitrogen,oxygen or fluorine are bonded to an H atom. N/O/F must have lone pairs. (naqbel)

iv)

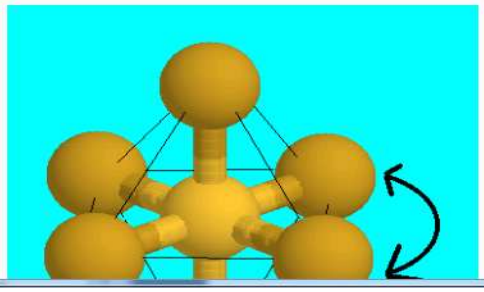
c)i) 4 electron groups ; 3bp,1lp therefore shape = trigonal pyramidal (cant draw it) (naqbel)

ii)SO3 2-, can be written in 3 different resonance forms. therefore delcalisation is present(i.e : sharing of electrons over more then 2 atoms). in SO3 2-, 3 equal S- -O (dotted) bonds are formed (longer than S=O, shorter than S-O)

d) NH2- : v-shaped(2bp.2lp) (jiena bent amiltu dan)

NO3- : trigonal planar (3 electron groups all b.p) (naqbel)

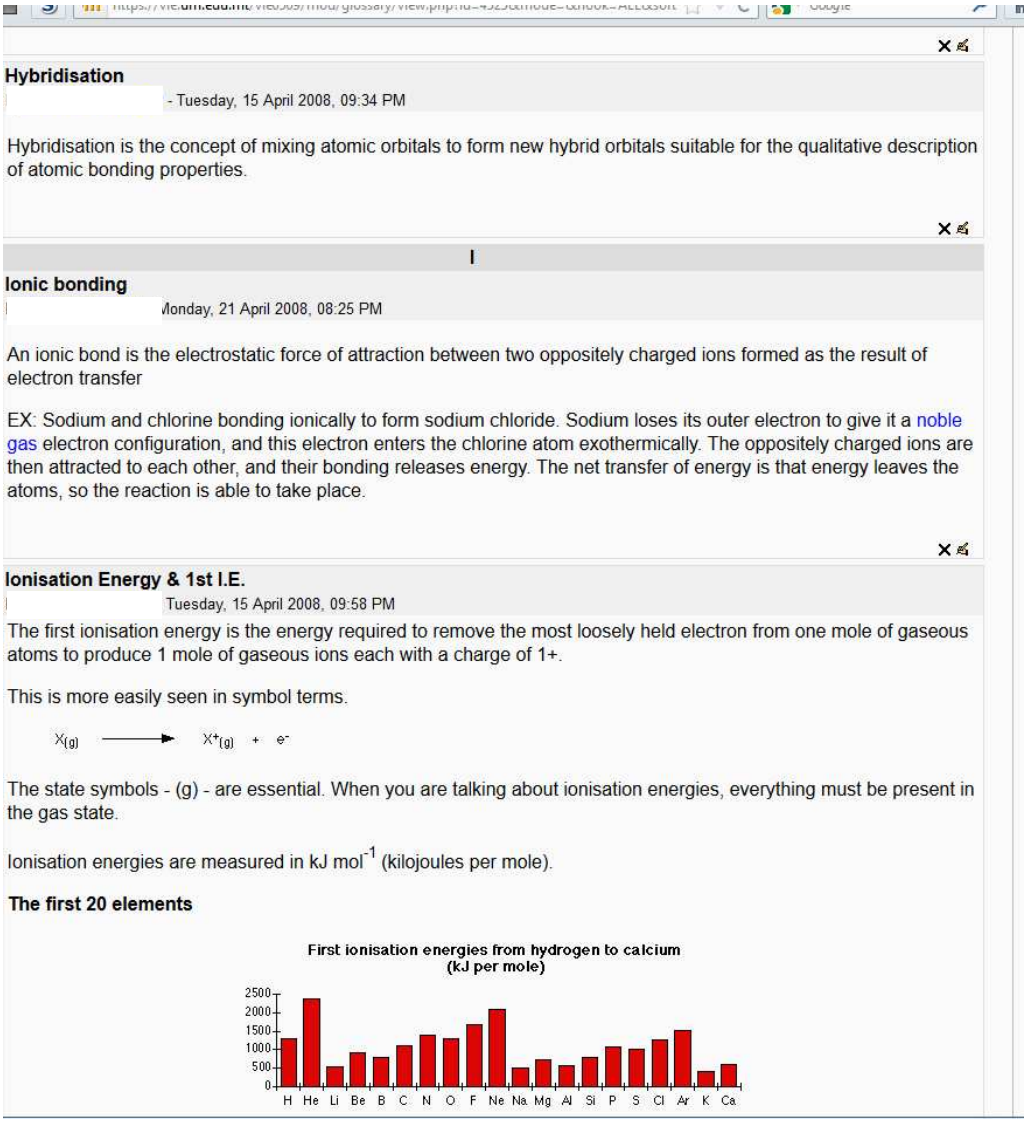
ALF6 3- : octahedral (6 b.p) (naqbel)



Appendix XII: The Glossary

Screen shot (VLE): Extract from the Glossary

(Students' names are not visible)



Hybridisation

- Tuesday, 15 April 2008, 09:34 PM

Hybridisation is the concept of mixing atomic orbitals to form new hybrid orbitals suitable for the qualitative description of atomic bonding properties.

I

Ionic bonding

Monday, 21 April 2008, 08:25 PM

An ionic bond is the electrostatic force of attraction between two oppositely charged ions formed as the result of electron transfer

EX: Sodium and chlorine bonding ionically to form sodium chloride. Sodium loses its outer electron to give it a noble gas electron configuration, and this electron enters the chlorine atom exothermically. The oppositely charged ions are then attracted to each other, and their bonding releases energy. The net transfer of energy is that energy leaves the atoms, so the reaction is able to take place.

Ionisation Energy & 1st I.E.

Tuesday, 15 April 2008, 09:58 PM

The first ionisation energy is the energy required to remove the most loosely held electron from one mole of gaseous atoms to produce 1 mole of gaseous ions each with a charge of 1+.

This is more easily seen in symbol terms.

$X_{(g)} \longrightarrow X^{+}_{(g)} + e^{-}$

The state symbols - (g) - are essential. When you are talking about ionisation energies, everything must be present in the gas state.

Ionisation energies are measured in kJ mol^{-1} (kilojoules per mole).

The first 20 elements